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THE HORIZONS OF SURGERY

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Gradually, the limitations of surgical achievements are being removed. This has been made possible by proper preoperative preparation; safer and more satisfactory anesthesia, and improved technical skills based on the principles of correction of the disturbed pathophysiology.

Benefits of corrective surgical methods are available today to patients who, 15 years ago, would immediately have been doomed, or who would have been forced to endure a nearly intolerable existence. Foremost examples are those with advanced malignancy and the degenerative vascular diseases. Obliterative peripheral vascular disease and aneurysms of the major vessels are especially worthy of consideration.

Elderly patients constitute the major group to be benefited by these extended efforts. And it must be remembered that with increasing longevity, more people will live to develop problems that require surgical care. According to the present trend, this number will probably continue to grow rapidly within a short period.

In view of the foregoing it is necessary to reevaluate from time to time, so that our enthusiasm for immediate results can be properly tempered by due consideration of the ultimate outcome. An individual assessment of each patient is the only means of determining the final benefit.

The surgical treatment of the elderly patient with a chronic peptic ulcer is a problem to be carefully scrutinized. Decisions for operation within this group should, of necessity, be few in number, for the extensive and prolonged procedures involved may result in a far more unpleasant existence than would otherwise be anticipated. Gastric resection itself in the aged can be accomplished without too much difficulty; and a reasonably safe mortality can be expected. The morbidity, however, is an entirely different problem. In large series it has been shown to be quite high, unpleasant, and sometimes prolonged. Although the economic factor is a lesser consideration, it should never be lost sight of in recommending radical surgery for the elderly. Since the end results are not always good, a question is raised as to the validity of the procedure.

Radical operations for malignancy have a definite place for middle aged and young individuals, but to subject the elderly patient to an extensive procedure requires precise evaluation and consideration of each case. There are frequent instances when the patient outlives the malignancy only to succumb to one of the complications of aging. So-called radical surgery may be required for palliation, but it is rarely justified in most of the advanced malignant lesions. It should be remembered that by nature of the disease significant improvement of this cannot be expected.

The optimum period for the cure of most conditions is in their incipiency, when it can be accomplished by relatively simple means. Initial efforts, therefore, must be directed towards that goal, taking into account the means for such accomplishment. When radical surgery is indicated, it should be performed if it is not pro-

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hibited by the risk involved. Only by a careful study and a thorough knowledge of the course of the disease can effort be properly directed.

The field of surgery continues to offer seemingly unlimited challenges, but we must be ever mindful of the end result in recommending and carrying out operations. Ultimate benefit to the patient with a minimum of harmful side developments should be the only factor influencing the decision. This attitude does nothing to hinder progressive improvement but should, rather, encourage and stimulate new developments.

PRIMARY CARCINOMA OF THE FALLOPIAN TUBE: TWENTY-FIVE-YEAR SURVEY (1930–1955) IN SIX LOUISVILLE HOSPITALS

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A lesion such as primary carcinoma of the Fallopian tube, that has an incidence of only 0.5 per cent of all the female genital tract malignancies, can be easily overlooked. Only five reported cases have been diagnosed preoperatively, and yet the reported cases have increased rapidly in the past five years. Ootherman reported the first clinical case in 1886, and up until December 1954 there had been 538 cases reported.

The record librarians of four Louisville Hospitals (Kentucky Baptist Hospital, Norton Memorial Infirmary, Saint Joseph's Infirmary, and General Hospital), in the years 1930–1955, have recorded 10 authentic operative cases, 3 having been previously reported by the author. Two other Louisville hospitals have no record of an authentic case in the same 25-year period.

The predominant symptoms are pains on one side of the lower abdomen, vaginal discharge, and bleeding. The average age of the 10 patients was 40.7 years. The age range was 17 to 82 years. Fifty per cent of the patients had a history of sterility. Four of the 10 patients were operated upon for pelvic inflammatory disease, and 3 for fibroids (table 1).

The vaginal discharge, which comes in spurts, is nonirritating, nonodorous, and blood tinged and it is usually associated with a mass in one side. This mass decreases in size, and the pain decreases as the discharge increases. Approximately 30 per cent of the cases are found to be bilateral. Two-thirds of the cases are in the colored race and over two-thirds of all cases are associated with pelvic inflammatory disease.

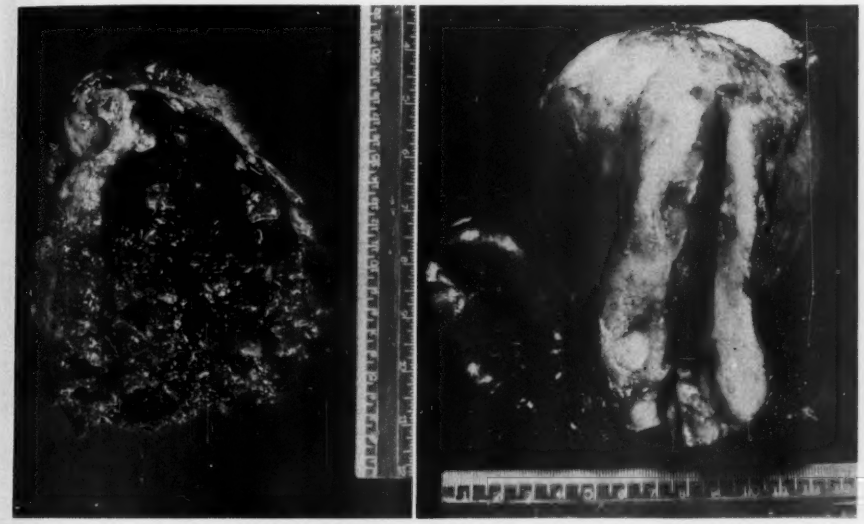

Fig. 1. M. L. 153000. 1951 Bilateral primary carcinoma of Fallopian tube.

In this series we found three types of neoplasms: malignant papillary carcinoma, adeno-carcinoma (predominant), and alveolar carcinoma.

Adeno-carcinoma, which predominates, usually begins at the terminal third of the tube and extends along the lumen. In one case in this series the tubal end was closed, and the growth had extended into the uterine cavity (fig. 1).

Because of the frequent association of the

TABLE I

Primary carcinoma of Fallopian tubes

Case	Age and Race	Para	Complaints	Diagnosis	Site	Operation	Pathology	Survival	X-ray Therapy
1*	40 C	2	Abdominal pain, vaginal bleeding	Pelvis inflammatory disease	Right	Super Cervical-hysterectomy, bilateral salpingo-oophorectomy	Right adenocarcinoma, fibroids, ovarian cysts	Recurrence after 1 yr., died in 1931	None
2*	46 W	0	Abdominal pain, spurts of nonodorous discharge, and vaginal bleeding	Pelvic inflammatory disease	Bilateral	Complete hysterectomy, bilateral salpingo-oophorectomy	Adeno-carcinoma, bilateral	Recurrence after 15 mo., died in 1950	None
3*	60 C	2	Vaginal discharge, and bleeding 3 mo. (postmenopause 10 yr.)	Fibroids	Bilateral	Complete hysterectomy, bilateral salpingo-oophorectomy	Papillary adenocarcinoma with extension	6½ yr.—well	None
4	29 W	0	Abdominal pain—right side. vaginal discharge and bleeding	Pelvic inflammatory disease	Right	Dilation and curettage, bilateral salpingo-oophorectomy	Papillary adenocarcinoma, salpingitis	21 yr.—well	Radium 1200 mg. x-ray 3000 r.
5	20 C	3	Abdominal pain—right side, vaginal discharge	Pelvic inflammatory disease	Right	Super Cervical-hysterectomy, 2 S., rt. O.	Adeno-carcinoma, salpingitis, mass right side	20 yr.—well	None
6	44 C	0	Abdominal pain, vaginal bleeding, diabetic	Fibroids, pelvic inflammatory disease	Right	Super Cervical-hysterectomy, bilateral salpingo-oophorectomy	Adeno-carcinoma and metastasis, fibroids	Recurrence after 4 mo., died in 1951	None
7	42 C	0	Abdominal pain, backache, distention	Ovarian malignancy	?	Super Cervical-hysterectomy, bilateral salpingo-oophorectomy	Adeno-carcinoma, carcinomatosis	Recurrence after 2½ mo., died in 1950	None
8	41 W	2	Vaginal discharge, bleeding 2 mo.	Pelvic inflammatory disease	Left	Dilation and curettage, Super Cervical-hysterectomy, appendectomy	Papillary adenocarcinoma (early), salpingitis	5 yr.—well	None
9	42 C	2	Abdominal pressure mass—2 mo., vaginal discharge	Ovarian cyst	Right	Complete hysterectomy, bilateral salpingo-oophorectomy, omentectomy	Adeno-carcinoma with extension	Recurrence after 6 mo., died in 1954	None
10	43 C	0	Abdominal mass—left lower quadrant, vaginal discharge, diabetic	Fibroids, pelvic inflammatory disease	Left	Super Cervical-, hysterectomy bilateral S., right O.	Right adenocarcinoma, salpingitis	1 yr.—well 1955	None

* Previously reported.

growth with pelvic inflammatory disease, treatment is usually conservative until the condition is too far advanced for a cure.

After carcinoma of the cervix and carcinoma of the fundus uteri have been ruled out by biopsy and curettage, cervical and uterine exfoliative cytology should be stressed. By such a study, over 80 per cent of the cases can be diagnosed. It is the greatest help next to exploratory laparotomy in the diagnosis of such cases

TREATMENT

The accepted treatment is total hysterectomy and bilateral salpingo-oophorectomy and excision

of all metastatic tissue. Since the disease is rare, frozen section diagnostic studies are usually not done. As a result, incomplete operations are sometimes carried out, making the prognosis poor. In properly selected cases deep x-ray therapy after the operation may be of palliative measure.

In this series, five of the patients, or 50 per cent, were alive and well 10.4 years after the operation. One patient is well 21 years after operation. The survival period of the remaining patients was 8.3 months.

Suggested measures for improvement of salvage rate are:

1. Periodic pelvic examinations, beginning in the middle forties.
2. Cytology smears from the cervix, vagina and uterine cavity. (Do not be satisfied with negative reports.)
3. Exploratory laparotomy in cases where there is a one-sided mass and the diagnosis is obscure.
4. After carcinoma of the cervix and fundus uteri has been ruled out and there is persistent vaginal bleeding, exploratory laparotomy is justifiable even in the absence of a palpable mass.
5. Gross and frozen section examination of tissue removed at the time of operation.
6. When the diagnosis of carcinoma of the Fallopian tube is made, total hysterectomy and bilateral salpingo-oophorectomy is advocated.

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PRELIMINARY OBSERVATIONS ON THE INJECTION OF POTENTIALLY CARCINOLYTIC DRUGS INTO THE PULMONARY ARTERY WITH TEMPORARY OCCLUSION OF THE BLOOD SUPPLY OF THE LUNG*

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The ability of the lung to withstand ischemia has been studied in our laboratory. These studies were done in connection with techniques of tissue transplantation and other important clinical principles which might depend upon the tolerance of the organ to occlusion of its blood supply. The original practical application involved the production of a bloodless field for the performance of segmental resections of the lung in technically difficult cases.

The results of our experiments have been recorded elsewhere and need not be reviewed in detail. It became apparent that the lung is a primitive organ and will tolerate interruption of its blood supply for surprisingly long periods. Total occlusion of the blood supply for as long as an hour was not followed by demonstrable anatomic changes. After thirty minutes of ischemia, however, lung function was seriously impaired.[2, 3]

With the introduction of certain potentially carcinolytic agents attempts have been made to concentrate these drugs in and about malignant lesions. Klopp and colleagues[5] and Bierman[1] independently experimented with intraarterial nitrogen mustard injections. Grady and colleagues[4] concluded that the adverse effects of intermittent intraarterial injections of nitrogen mustard exceeded their benefits. The principal disadvantages were necrosis of soft tissues from extravasation of the drug, bone marrow depression, and other debilitating effects. The use of an extracorporeal circuit for the perfusion of isolated viscera has recently been reported by Ryan, Krementz, and Creech of Tulane University.[6] Phenylalamine mustard was employed.

Since earlier studies in both the human and animal lungs indicated that the organ would withstand a period of thirty minutes of total ischemia, an arbitrary time of fifteen minutes was selected for trapping various carcinolytic drugs in the lungs of experimental animals.

Although the experiences of other investigators suggested that nitrogen mustard would not be tolerated by lung tissue, this agent was tried in eight dogs (table 1). It became apparent that nitrogen mustard was so destructive to lung tissue that it would not be feasible to employ the drug either experimentally or in the human subject.

Triethylene thiophosphoramide (TEPA) was next employed with the same technique, namely, injection of the agent into the pulmonary artery followed by occlusion of the pulmonary hilum with trapping for a period of fifteen minutes. The tourniquet was then removed and the wound closed.

TEPA (triethylene thiophosphoramide) was used in five dogs (table 2). All of these animals died and the injected lung was acutely inflamed. Changes were similar to, but not so violent as those treated with nitrogen mustard. It is of some interest that in the three animals that survived for a three-day period, there was suppression of neither erythrocytes nor leukocytes after release of a relatively large dose of the drug.

The third carcinolytic agent tested was MEPA (oxapentaethylene phosphoramide). The results following the injection of MEPA into the pulmonary artery were encouraging. Five of eleven dogs are still living after injection and trapping of the drug. In five other animals death appeared to be from causes unrelated to any reaction in lung tissue from the drug. In one animal a dose of 2 mg. per kg. was given, and it was apparent that this relatively massive dose was excessive since the injected lung showed changes similar to those seen after nitrogen mustard injection (table 3).

Doses of 1 mg. per kg. injected into the pulmonary artery and trapped in the lung were well tolerated. This is of particular significance since

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in the human being the usual dose given intravenously is 1/8 to 1/4 mg. per kg.

It appears that there was no significant effect on the erythrocytes and leukocytes from the sudden release of the drug when the occlusion was terminated (table 4).

The uniform lack of suppression of the hemopoietic system with this technique after release of the tourniquet is of importance and suggests that the method may be useful in delivering carcinolytic agents to a confined organ.

Difficulties in tagging MEPA, which appears to be the only safe drug for injection into the pulmonary artery, with radioisotopes have temporarily precluded studies on concentration of the drug in the lung. Studies with tagged sulfa mustard, however, in acute experiments which involve injection, occlusion, and total pneumonectomy after the occlusion is released suggest strongly that there is a high concentration of the tagged drug in the lung injected with minimal escape to other organs in the body.

TABLE 1

HN_2 (methylbis(2-chloroethyl)amine hydrochloride

No. of dogs: 8
Dosage of drug: 1/16–1/4 mg./kg.
Results: All developed pulmonary edema and expired within 24 hours following injection of the drug into the pulmonary artery
Pathology: Marked pulmonary hyperemia and pulmonary infarction were noted in the recipient lung

TABLE 3

MEPA (oxapentaethylene diethylene) phosphoramide

No. of dogs: 11
Dosage of drug: 1/8–2 mg./kg. body weight
Survival: 5
Deaths: 6
- 2 mg./kg.—massive pulmonary edema (overdose) (immediate death)
- 1 mg./kg.—atelectasis and pneumothorax
- 0.5 mg./kg.—atelectasis
- 1/8 mg./kg.—pneumothorax

The deaths did not appear to be related to effects of the drug except in the animal receiving an overdose.

SUMMARY

1. The ability of the lung to tolerate temporary ischemia has been established.

2. Various carcinolytic agents (nitrogen mustard, sulfa mustard, TEPA, and MEPA) have been injected into the pulmonary artery, and the

TABLE 2

TEPA (Triethylene Thiophosphoramide)

Dog	Dose		Pre-op	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
	mg./kg.									
1	1/2	RBC	4.81			5.99				Expired
		WBC	10,700			24,000				(Pneuminia)
2	1/2	RBC	6.35			6.95		Expired		
		WBC	6,500			31,100		(Pneumonia)		
3	1/2	RBC	7.35		Expired					
		WBC	3,750		(Pneumonia)					
4	1/2	RBC	7.20	Expired						
		WBC	4,200	(Pulmonary edema)						
5	1/2	RBC	3.92	Expired						
		WBC	27,400	(Pulmonary edema ? distemper)						

Pneumonitis and infarction a constant finding. Similar to, but not as severe as with HN_2.

TABLE 4
MEPA

Dog	Dose		Pre-op	Days									
				1	4	7	10	13	17	20	27	34	40	52
	mg./kg.													
1	¼	RBC	5.66	5.73	5.49	4.58	4.97	4.46	4.66	4.55	6.85	5.64	6.90	
		WBC	12,300	30,850	33,450	17,100	14,900	18,100	11,750	15,550	8,000	21,400	28,700	
2	½	RBC	3.63	3.49	3.81	3.46								
		WBC	9,450	31,000	24,350	34,850								
3	½	RBC	7.10	4.94	4.87	4.42	3.19	4.50	3.40	3.79	6.76	5.80	6.65	
		WBC	16,900	35,700	25,850	8,200	18,650	32,900	23,300	7,700	20,450	11,700	16,400	
4	1	RBC	4.71	4.50	4.05		3.51							
		WBC	5,850	12,500	14,950		14,650							
5	1	RBC	8.60	7.75	6.8									
		WBC	7,650	22,750	24,650									
6	1	RBC	8.70	9.55	9.0		9.0	8.02	6.51					
		WBC	12,150	16,600	19,100		10,500	7,500	12,600					
7	1	RBC	6.35	6.05	6.05									
		WBC	16,100	15,400	14,650									

total blood supply has been occluded for 15 minutes after the injection.

3. After release of the occlusion with circulation restored for varying periods there was no demonstrable effect on the hemopoietic system as manifested by leukocyte and erythrocyte counts.

4. Nitrogen mustard, sulfa mustard, and TEPA injections were followed by death of the animals in one to five days from acute inflammation of the treated lung.

5. Injections of MEPA into the pulmonary artery with the same occlusion times were tolerated.

6. Preliminary experiments with tagged sulfa mustard suggest high concentrations of the drug are retained in the lung after temporary occlusion of the blood supply is released.

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UNRECOGNIZED CARCINOMA OF THE CECUM DIAGNOSED PREOPERATIVELY AS APPENDICITIS

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The onset of carcinoma of the cecum is occasionally ushered in with symptoms of acute or subacute appendicitis. The association of carcinoma of the cecum with appendicitis is not rare, and its coexistence must be considered in all patients of cancer age who present signs of appendicitis. It is only when the condition is sought after, with awareness of its possibility, that there can be a reduction in the incidence of unrecognized cecal carcinoma. There is no doubt that the dual association of appendicitis and cecal cancer occurs with greater frequency than one is led to believe from a perusal of the literature. Although the number of recorded cases of the dual conditions is less than 100, the total number must be larger, since these represent only the published ones, while there must be many more which have not been so recorded. McLaughlin[11] in 1946 found only 11 instances and reported an additional case. Burt[2] in 1949 found 13 cases and added 4 of his own. Hellsten and Ramström[7] in 1951 found 12 previously reported cases and added 4 of their own. Robinson and Ernst[15] in 1953 collected 19 cases and added another case. Thomas[17] was able to find 28 recorded cases of the coexistence of carcinoma of the cecum and appendicitis. A review of the literature up to 1957 disclosed 69 cases, the case recorded herein making a total of 70 cases.

It is not my intention to imply that there had been any errors in the diagnosis of cancer of the cecum or appendicitis, but rather to point out and emphasize three diagnostic problems: (1) The two conditions, appendicitis and carcinoma of the cecum, frequently coexist. (2) The symptomatology of appendicitis often dominates the clinical picture. (3) Despite the symptomatology of appendicitis, a barium enema roentgen examination, carefully performed, offers the best means to demonstrate the carcinomatous lesion in the cecum.

Our experience with the following case is a representative example of the occurrence of the dual conditions of cancer and appendicitis.

CASE REPORT

A 62-year-old man suffered with acute pain in the right lower quadrant, nausea, vomiting, and fever. Physical examination revealed marked tenderness limited to the right lower quadrant. No mass could be palpated. Blood examination showed a leukocytosis. Owing to the acuteness of the illness, and the characteristic typical clinical picture of appendicitis, roentgen examination of the gastrointestinal tract and colon was not made. An operation was performed through a McBurney incision. The appendix was found to be inflamed; the base of the appendix and surrounding cecal area revealed some induration, which was thought to be of inflammatory nature. The appendix was removed and the abdomen was closed with complete healing. Three months later the patient complained of discomfort in the right lower quadrant. At this time the examination revealed a definite tender mass, which was thought to be due to an abscess. A barium enema roentgen examination revealed an infiltrating neoplastic type of filling defect in the cecum characteristic of malignancy. At reoperation the cecocolon was resected and a carcinoma of the cecum was found.

In a study of a series of cases of carcinoma of the right colon, Ransom[14] reported 11 per cent, and Mayo[8, 9, 10] 15 per cent of patients had previously had an appendectomy. According to Patterson and Deaver,[13] 10 per cent of patients with carcinoma of the cecum presented an acute appendicitis as a complication. Ackerman and del Regato[1] noted that 25 per cent of patients with cecal cancer were operated on with a preoperative diagnosis of appendicitis. Costello and Saxton[4] studied 122 cases of carcinoma of the cecum, and of these 31 were diagnosed as appendicitis. In Hellsten and Ramström's[7] 28 cases of cecal carcinoma, 7 presented a clinical picture of appendicitis; of these, 4 revealed the coexistence of appendicitis, and in 3 instances the appendix was normal. Burt[2] reviewed 98 operative cases of cecal cancer and found 4 instances associated with acute appendicitis or paracecal abscess. Schutt and Walker[16] reported 73 cases of cancer

of the right colon, of which 4 underwent an appendectomy and only 1 revealed a coexisting appendicitis. Ewing,[5] in a report of 10 cases of cancer of the cecum associated with appendicitis and/or abscess, comments on the high incidence of the occurrence of the dual conditions.

It has been definitely established that occlusion of the lumen of the appendix is observed in a high percentage of cases of appendicitis. Collins[3] in 3400 cases of acute appendicitis found an obstructive lumen in about 50 per cent. When the cecal carcinoma infiltrates the area around the base of the appendix, it tends to occlude its lumen with resulting infection and/or abscess, perforation and/or fistulous and sinus formation. Patterson[12] noted that one-fourth of 72 cases of cecal cancer presented acute inflammatory features dominating the clinical picture; of these, 13 involved the base of the appendix which blocked the lumen. Abscess formation is a frequent complication of appendicitis associated with carcinoma of the cecum. The abscess may be either caused by infection of the occluded appendix, or produced by a perforation of the cancerous growth. The abscess presents a tender mass in the right lower quadrant. If it is associated with anemia, loss of weight, and blood in the stools, the diagnosis favors carcinoma. Because of the abscess, the surgeon rarely explores the cecum; in consequence, the primary cause of the condition is not determined. The appendix is often buried in the abscess, or it cannot be found.

Not infrequently, several operations are necessitated before the carcinomatous condition is found. Of 31 collected cases in which detailed reports were described, 10 were recognized at the first operation, 15 after the second operation, and 6 after the third operation. In 29 cases analyzed by Thomas,[17] 11 were discovered at the first operation, 16 at subsequent operations, and in 2 instances at autopsy. The 2 autopsied cases had had four previous operations.

Carcinoma of the colon most commonly occurs in the fifth and sixth decades and is comparatively rare below the age of 40 years. When the dual conditions of carcinoma of the cecum and appendicitis occur in individuals below the age of 40 years, the presence of a malignancy is not suspected. It must be pointed out that appendicitis occurs infrequently in the aged. However, since the dual lesions are more apt to occur in elderly patients, any case of acute or subacute appendicitis occurring beyond the age of 40 years should be thoroughly explored for the possibility of a malignancy of the cecum.

The coexistence of carcinoma of the cecum and appendicitis is more commonly observed in the male sex.

The symptoms of an acute appendicitis may be the first indication of a malignancy of the cecum. When the dual conditions occur, the appendiceal symptomatology dominates the clinical picture. Because of this feature, the carcinomatous growth is silent and is frequently undetected. Wakeley and Rutherford[18] pointed out that a leukocytosis is present in about 50 per cent of cases, which favored the preoperative diagnosis of appendicitis. The detection of carcinoma of the cecum is frequently not discovered because of the emergency nature of the operation —especially when a McBurney incision is made, in which case the cecum cannot be fully explored. There are many other circumstances which contribute to the inability of making a diagnosis of the true nature of the condition. These are (1) inadequate preoperative study, (2) predominating appendiceal symptomatology, (3) failure of the surgeon to examine the cecum carefully during the operation, (4) exploration being inadvisable because of the inflammatory process or abscess formation, and (5) inability of the surgeon to distinguish the cancerous infiltration from inflammatory induration. It is important to emphasize that following an appendectomy, any case presenting a draining sinus, fecal fistula, or a painful right lower quadrant mass should lead one to suspect a malignancy. In 16 operated cases, Thomas[17] found 8 with drainage of an appendiceal abscess, 4 with simple appendectomies, and 4 with appendectomies with drainage of the abscess. Of the 16 cases, 13 developed fecal fistulas after the first operation.

The roentgen examination of the cecum should be an important procedure in the diagnostic study. Attention must be directed to the fact that there is little or no hazard in performing a diagnostic barium enema in suspected cases of the dual conditions. Since the likelihood of a true primary appendiceal inflammatory process is less apt to occur in elderly people, it is essential that a thorough roentgen examination of the cecum be made in these cases. An analysis of cases recorded in the literature disclosed a minimum of

preoperative diagnostic measures. A striking feature was the lack of barium enema roentgen studies in these cases. Failure to carry out a more painstaking examination was no doubt due to the acuteness of the condition, and the belief that the roentgen examination was unnecessary because of the typical clinical picture of appendicitis.

It has been frequently stated that small carcinomatous tumors of the cecum are often difficult to demonstrate roentgenologically, because of the large capacity of the cecum, the location of the tumor and its overshadowing by the opaque medium. Moreover, it has also been stated that, since these tumors do not tend to produce obstructive signs until late, they may be overlooked even by competent roentgenologists. Notwithstanding these facts, it might be stated here that a painstaking roentgen investigation of the cecum would be highly rewarding if the lesion was sought after. Unfortunately, when the barium enema examination is performed it is done too hurriedly, so that a complete detailed study of the cecum cannot be made. This is especially true if the patient is acutely ill, or has difficulty in retaining the barium clysma long enough. The roentgen examination should include a study of the cecum with the compression technique, spot films, right and left oblique views, as well as prone and supine films. Further studies should be made after the evacuation of the barium clysma, and if possible following air insufflation of the bowel. The latter studies are highly important for the detection of small growths.

SUMMARY

A patient with carcinoma of the cecum associated with appendicitis is reported, in whom the appendix was removed and later at reoperation a carcinoma of the cecum was found. It is worthy of comment to point out that the clinical diagnosis of appendicitis is frequently made in cases with carcinoma of the cecum. The appendix is secondarily inflamed or complicated by an abscess, perforation or sinus formation, so that the dual conditions coexist at the time the patient presents himself for examination. In some patients the appendix may be normal, but symptoms simulating appendicitis masquerade the malignancy. The incidence of carcinoma of the cecum with the symptomatology of appendicitis varies from 10 to 25 per cent, but the incidence of the dual conditions coexisting ranges from 4 to 15 per cent.

Clinically the diagnosis of cecal carcinoma is often difficult to make because the presenting signs and symptoms are those of appendicitis. At times, even at operation, it is difficult for the surgeon to determine the presence of a malignancy of the cecum, because of the extensive inflammatory process. Occasionally the carcinomatous lesion is not found until after several operations have been performed. The age of the patient might be a factor in raising the index of suspicion of carcinoma, since appendicitis is comparatively uncommon in elderly people.

The importance of a thorough painstaking roentgen examination of the cecum by means of a barium enema is stressed. This examination is recommended in all cases presenting the symptomatology of appendicitis after the age of 40 years. The majority of cases with the dual conditions can be preoperatively diagnosed so that the malignant tumor can be surgically removed, thus offering greater chance of recovery.

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DEGENERATING CAVERNOUS HEMANGIOMA OF THE LIVER CAUSING SMALL BOWEL OBSTRUCTION

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Although cavernous hemangioma occurs more frequently in the liver than in any other abdominal viscus, its association with intestinal obstruction is exceedingly rare.[27, 29] No report of a cavernous hemangioma of the liver causing small bowel obstruction has been found in a review of the literature of the past 35 years. Cavernous hemangioma of the liver causing small bowel obstruction is reported because of its rarity, interest and diagnostic difficulties which it presented.

CASE REPORT

History of present illness. This 6-month-old white girl was admitted to Holzer Clinic and Hospital with a history of fever and vomiting for 48 hours. At the onset, the child screamed, doubling over as if having cramping pain. She vomited, then slept quietly for 12 hours. She awakened screaming and vomited copious amounts of light green fluid. Her behavior suggested that she was having paroxysms of cramping abdominal pain. The last bowel movement was 36 hours before admission. The stool was scanty, hard, and of normal color. The family was unaware of any flatus or stool in the preceding 36 hours. She was referred to the hospital for intractable vomiting.

The patient, the youngest of four children, was delivered following a prolonged labor. The 40-week gestation and delivery were uneventful. The child was apparently normal.

In the mother's opinion, the baby had always been reluctant to eat and did not grow as rapidly as the other siblings. Approximately once a week the child had had brief paroxysms of abdominal pain, screaming as she bent over her hyperflexed lower extremities. At the age of 4 months, during a respiratory infection, she had had anorexia and vomiting for one week. This had been relieved by changing her formula to evaporated milk.

Physical examination. The rectal temperature was 104°F. Her weight was 7.4 kg. The skin was hot, ashen and dry, and the child was very lethargic. No hemangiomas were seen on the skin. The fontanels were closed. The conjunctivae were slightly injected, and there was an acute erythematous pharyngitis. The neck was supple, and the physical signs over the chest indicated a mild bronchitis. There was a sinus tachycardia. The abdomen was tense and distended, but neither tenderness nor rigidity of the muscles was elicited. No peristaltic sounds, masses, or fluid were detected. Brown, hard, dry stool was found on rectal examination.

Laboratory. Analysis of the urine was normal. Complete blood count showed 4.15 million red blood cells, 11.8 gm. per cent hemoglobin, 28,600 white blood cells with 75 per cent neutrophiles, and 27 per cent lymphocytes. Roentgenograms revealed markedly dilated loops of small bowel, presenting a stepladder pattern lying mainly in the left upper quadrant of the abdomen. No gas was visible in the colon.

Course in the hospital. The preoperative diagnosis was a small bowel obstruction, secondary to malrotation (incomplete rotation) of the gastrointestinal tract, with extrinsic duodenal compression from a congenital band and volvulus of the small intestine. A polyethylene saphenous venoclysis, nasal oxygen, and alcohol-tepid water sponges were started. The patient's temperature dropped to 101°F. A no. 10 French rubber catheter was inserted through the nose into the stomach, and 15 cc. of fecal-like material was withdrawn.

Using open-drop ether anesthesia, a paramedian incision was made from the right costal margin to the umbilicus. The cecum and transverse colon were in their normal positions. Many dilated loops of small bowel were seen, mostly in the left upper quadrant, and here was found the point of obstruction.

The left lobe of the liver was markedly enlarged and elongated. The anterior inferior border was tongue shaped, and projected downward to the anterior abdominal wall over the upper left lumbar gutter. It started as a wide band of hepatic tissue. Distally, all diameters decreased as the hepatic tissue became soft and cyanotic, gradually merging into a dense fibrous plaque 4.5 cm. in diameter and 5 mm. thick. The postoperative microscopic diagnosis of a cavernous hemangioma was not suspected. The pathologic anatomy suggested an infarct of the liver. Anteriorly, the plaque was adherent to the anterior abdominal

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wall. Three loops of small bowel were adherent to the posterior surface of the plaque and were obstructed (fig. 1). The plaque was separated from the abdominal wall and the intestine, thus releasing the angulated and obstructed bowel. The abnormal segment of the liver was resected. This was easily accomplished by division between Kocher clamps and using interlocking silk mattress sutures for hemostasis. In addition to the above, many superficial linear grayish white interlacing fibrotic bands were found on the surface of the mesentery of the small bowel. There were enlarged soft gray lymph nodes in the mesentery, many being 2 cm. in diameter. The latter findings suggested an inflammatory process similar to an old meconium chemical peritonitis, as described by Abt,[1] Boikan,[5] and Matheson.[15]

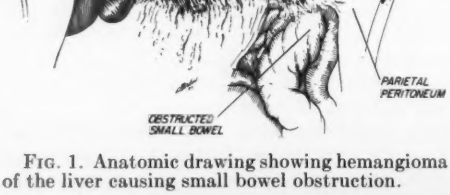

FIG. 1. Anatomic drawing showing hemangioma of the liver causing small bowel obstruction.

Pathology report. Examination of the specimens showed fibrous distortion of the liver lobules. Within the liver parenchyma and fibrous tissue there were numerous blood-filled channels of varying size. In some areas, the vascular channels were separated by dense collagen, but in other areas, a cellular stroma, composed of spindle cells, was seen. There was no evidence of endothelial cell proliferation. Occasional channels contained plugs of fibrin, and others showed thrombosis with an inflammatory reaction. Several foci of calcification were seen. The diagnosis was cavernous and capillary hemangioma of the liver (fig. 2).

Until the return of normal gastrointestinal function and the resumption of oral feedings on the fourth postoperative day, the child was maintained on nasogastric suction and parenteral alimentation. The remainder of her postoperative course was uneventful, and she was discharged on the eighth hospital day.

DISCUSSION

Hemangiomas have been reported to cause bowel obstruction; however, the organ of origin has been the intestine. In our review, no other hemangioma of the liver has been reported to cause small bowel obstruction.

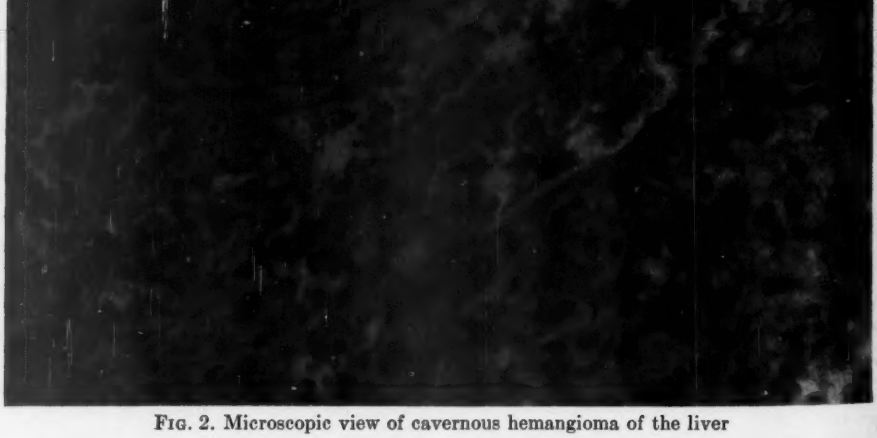

FIG. 2. Microscopic view of cavernous hemangioma of the liver

Hemangiomas of the gastrointestinal tract were described in 1839 by Phillips,[19] and of the small intestine in 1860 by Gascoyen. In the literature Goldfarb and associates[11] reported only 66 hemangiomas of the small intestine between 1860 and 1948. Polayes and Nevins[20] in their review reported 95 angiomatous lesions of the gastrointestinal tract in 1945. Raiford[21] and Merchant[16] separately reported only 6 hemangiomas of the small intestine in two series with 18,840 autopsies and 95,775 surgical specimens. Hemangiomas of the small intestine present a clinical picture of chronic mild or acute severe blood loss. They also may cause obstruction of the small bowel by virtue of constriction or intussusception. The hepatic origin of the hemangioma in our case can be established by the pathologic report and by the smooth cleavage plane between the lesion and normal bowel.

Ewing[8] believed angiomas to be developmental anomalies in the structure of certain vascular segments, retaining thereby many embryonal characteristics. Ribbert[23] contended that they were partial neoplasms in that segment of the vascular tree displaced by embryonic disturbances and possessing aberrant growth power. There are unresolved, conflicting opinions concerning the origin and neoplastic potential of the individual cellular components of hemangiomas. Most agree with Watson and McCarthy[29] that the angioma (hemangioma and lymphangioma) is a true neoplasm of vascular and lymphatic tissue of a congenital nature, arising from an embryonic sequestration in the mesodermal tissue. In accord with this, as stated by Ray,[22] these tumors are most frequently found at the specific sites where the angioblast, the anlage of primitive vessels, develops; *i.e.*, in the splanchnic mesoderm of the body stalk and yolk sac. Nevertheless, in reviewing the literature, we have found no organ in which the hemangioma has not occurred.

It is beyond the scope of this report to discuss in detail the varied morphologic and cytologic characteristics of hemangiomas and the classifications which have been derived from these characteristics. We believe the reports of Geschickter and Keasbey[10] and Watson and McCarthy[29] to be extremely practical in the diagnosis and therapy of these tumors. Geschickter and Keasbey reported 570 blood vessel tumors —376 on the body surfaces, 109 in the liver, 65 in the bone, muscle, and central nervous system, and 25 in the heart and other viscera. Of the 1308 hemangiomas reported by Watson and McCarthy, only 4 were seen in the liver (most being in the skin). Yet, of all the viscera, the liver was most commonly involved. They find, as do others, that hemangiomas in the liver are usually cavernous. Two cases of diffuse systemic hemangioma with primary coincidental involvement of the liver and other viscera were found. Benign metastasizing hemangiomas of the liver were documented by Robinson and Castleman[24] and by Shennan.[25] Fox and Cella,[9] in reporting a hemangio-endothelioma of the liver, found only 3 such tumors in the records of Children's Memorial Hospital in Chicago. Many cases of hepatic malignant angiomas are reported under many names. They are usually seen in children and are rapidly fatal.[3, 14] Most hemangiomas grow slowly and cease to grow when maturity is reached. The racemose hemangioma, however, has a continuous interchange of blood, through direct vascular channels, with the host, and consequently continues to grow more rapidly. In Watson and McCarthy's[29] Memorial Hospital series, only 3 of 1308 hemangiomas showed spontaneous regression. This demonstrates the fallacy of delaying treatment in a futile hope of regression.

Hemangiomas are the most common tumors occurring in children. Pagani-Cesa and Scolani reported 258 tumor patients in 42,827 admissions to the Children's Hospital of Bresica during the years 1942 to 1951. Fifty per cent of these tumors were hemangiomas.[18] Watson and McCarthy's classical report of 1001 patients with 1308 hemangiomas at Memorial Hospital in the years 1931 to 1939 also revealed the hemangioma to be the most common neoplasm of children. Seventy-three per cent were present at birth and 85 per cent were seen in the first year. Sixteen per cent of the patients had multiple lesions.[29]

Shumacker,[26] in his collective review of 66 cases of hepatic hemangioma found at surgery, reported an age distribution of 6 to 76 years, with an average of 44 years. His reported sex ratio of 4.5 females to 1 male is generally recognized. Hemangiomas often begin to grow with the onset of menses and pregnancy, suggesting a relationship to the female sex hormones.

Cavernous hemangiomas in the liver are often asymptomatic and unsuspected, and are discovered as an incidental finding at operation or

necropsy. They vary in size and are invariably located on the surface of the liver.[29] In Shumacker's[26] series of hepatic hemangiomas, demonstrated at operation, 50 per cent of the patients initially complained of vague gastrointestinal symptoms such as nausea, vomiting, or midepigastric pain. The remaining half first noticed an abdominal mass. The duration of symptoms ranged from a few to 30 years, with an average of 5½ years. The physiology of these symptoms is not entirely explained. Wakely[28] reported 8 cases of hepatic hemangiomas causing extrinsic pressure on the lesser curvature of the stomach and one case of displacement of the colon. He reported a hemangioma of the liver causing obstruction of the esophagus, suggesting a preoperative diagnosis of carcinoma of the esophagus. The most serious manifestation of the hepatic hemangioma is hemorrhage. This hemorrhage may be spontaneous or may follow trauma, and in many cases has occurred at the time of surgery.[12, 27]

In the diagnosis of hepatic hemangioma a high index of suspicion is necessary. As stated above, a tumor mass was the first complaint in 28 of 61 cases, and 12 others developed the tumor mass later. On physical examination there are usually no pathognomonic characteristics. Over 50 per cent occur in the left lobe. Beck[2] diagnosed correctly one case on the evidence of a buzzing murmur heard over the liver. In Shumacker's[26] series, only 2 cases of the 66 hepatic hemangiomas were diagnosed correctly before operation.

The treatment of choice for hepatic hemangiomas is surgical excision. The two successful excisions first reported were in 1897 by Keen[13] and von Rosenthal.[27] The ingenious methods and the history of the development of hepatic surgery can be found in the reviews on this subject and are beyond the scope of this report.[2, 4, 5, 6, 17, 26]

With specific reference to surgery of the hepatic hemangioma, Shumacker[26] has summarized many pertinent points. Hemangiomas should never be aspirated, biopsied, or traumatized. The mere penetration of a needle may result in an uncontrollable fatal hemorrhage. In his review of 66 cases there were 56 resections and one death. In the remaining cases, there were 5 deaths. Duckett and Montgomery[7] and others have shown that large portions of the liver may be sacrificed without impairment of function, because regenerative power is great. The anastomoses between the primary branches of the hepatic artery allow ligation of either branch in the resection of large hepatic tumors. In the Memorial Hospital series[2] the majority of cavernous hemangiomas were found to be radio-resistant, and generally this resistance increased with the age of the patient. Ray,[22] however, has reported a satisfactory response to roentgen therapy in an unresectable hemangioma of the liver. This patient showed symptomatic relief. The shrinkage of this tumor was shown radiologically by the contracture of of the diameters between Cushing clips placed at the tumor border. In the case herein reported, the line of resection was through normal tissue, and the excision was adequate. Although spontaneous regression is rare, there is no doubt of its occurrence in this case as shown by the hemorrhage, thrombosis, inflammation and replacement fibrosis. In accordance with these facts, the known slow growth of these tumors, and the rarity of malignant transformation, further therapy is unwarranted.

SUMMARY

A case of degenerating cavernous hemangioma of the liver causing small bowel obstruction is reported. The embryology, pathology, clinical course and treatment of hepatic hemangiomas are reviewed.

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SPONTANEOUS, COMPLETE RUPTURE OF THE THORACIC AORTA*

Case Report

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Spontaneous, complete rupture of the thoracic aorta, in the absence of an aneurysm, is uncommon. Its occurrence immediately following laparotomy posed a complication not previously encountered. This is a report of a patient who, at the close of an uncomplicated laparotomy, suddenly developed a massive rupture of an aorta which grossly and histologically demonstrated little evidence of pre-existing disease.

CASE REPORT

A 54-year-old white man was hospitalized on March 4, 1957, with nausea and colicky lower abdominal pain of two days' duration. Although generalized at first, the pain had localized in the right lower quadrant. The patient was known to have been hypertensive for the preceding 8 years. There was no history of trauma or of syphilis. His temperature was 101°F., and his blood pressure was 200/80. His eye grounds reflected moderate hypertensive changes. Examination of the chest revealed a systolic murmur at the apex of the heart. Abdominal pressure elicted tenderness in the right lower quadrant. His urine contained albumin; his serologic test for syphilis was negative.

A preoperative diagnosis of acute appendicitis was made. He was given penicillin and streptomycin, in addition to 100 mg. of Demerol and 0.45 mg. of atropine sulfate. One gram of thiamylal sodium was given intravenously for induction and was followed by closed endotracheal anesthesia using nitrous oxide and oxygen. He received 900 ml. of 5 per cent glucose in water during the procedure.

Through a right lower quadrant transverse incision, laparotomy revealed a normal appendix and no adequate explanation for his abdominal pain. He tolerated the procedure well, without any hypotensive episode. At the completion of the procedure, the patient was beginning to respond when the endotracheal tube was removed. As the tube was removed, he strained and coughed, but not to an unusual extent. A few seconds later, he suddenly became pale and his pulse volume became weak and thready. Cardiac arrest followed. A thoractomy was immediately performed through the 4th left interspace. The pleural cavity contained a large amount of fresh blood. Cardiac massage and resuscitative measures were ineffective in restoring cardiac activity.

Autopsy revealed a perforation of the thoracic aorta, 1 cm. beyond the origin of the left subclav-

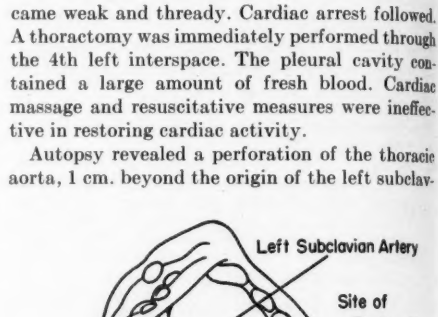

Fig. 1. Demonstrating the point of spontaneous perforation of the aorta.

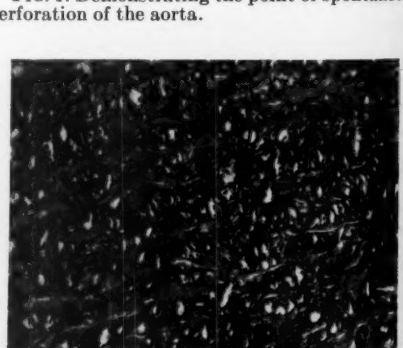

Fig. 2. Photomicrograph of aorta demonstrating minimal cystic medial necrosis.

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ian artery (fig. 1). The perforation was 4 cm. in length; it began posteriorly and extended distally and obliquely ventrally across the long axis of the aorta. Proximal and distal to this perforation the aorta was of normal caliber. A large mediastinal hematoma was present. On opening the aorta, scattered atherosclerotic changes were found. There were a few atherosclerotic plaques near the site of perforation, but the perforation did not occur in the base of an atherosclerotic ulcer. The edges of the perforation were moderately clean-cut. There was no aneurysm.

Sections from the edges of the perforation of the aorta showed the histologic changes of very minimal cystic medial necrosis (fig. 2). Stains for elastic fibers also showed minimal changes of cystic medial necrosis.

There was a small sealed perforation of a sigmoid diverticulum without a marked inflammatory response.

DISCUSSION

Spontaneous rupture of the aorta is a most unusual and unexpected postoperative complication. Its fatal outcome could hardly have been prevented, for hemorrhage was massive and exsanguination immediate.

The few substantiated examples of spontaneous ruptures were usually explained on the basis of intrinsic pathology of the aorta.

Rupture secondary to saccular aneurysm, aneurysm proximal or distal to an area of coaretation, or to disease of the adjacent esophagus is rather frequent, but the sudden development of a 4-cm. hole in a grossly normal aorta is difficult to explain.

Many of the "idiopathic" ruptures recorded in the earlier literature appear, in retrospect, to have been ruptured dissecting hematomas (aneurysms). External ruptures of dissecting hematomas can usually be explained on the gross appearance of massive medial dissection and eventual rupture into the thoracic cavity. Cystic medical necrosis[1–3] is a well recognized degenerative change which has been considered the factor essential for dissecting aneurysm.

Aortic rupture cannot be explained solely on the basis of aortic intraluminal pressure. An intraluminal pressure of 3000 mm. Hg is necessary to rupture a normal thoracic aorta.[5] Spontaneous rupture in the absence of some degree of dissection is quite rare, and Robertson and Smith[6] have shown the virtual impossibility of producing a dissection through an intimal defect in the presence of a normal media.

The known contributory factors which were present in this patient were a weakened media and hypertension. How much of a secondary elevation in his arterial pressure resulted from the straining of extubation is not known, but it was possibly considerable. It is interesting that the site of rupture in this patient corresponds to the findings in the deceleration type of injuries to the thoracic aorta, the rupture having occurred at the junction of the fixed isthmus with the mobile descending thoracic aorta.[4]

SUMMARY

A patient is presented who spontaneously ruptured his thoracic aorta in the immediate postoperative period. The rupture occurred without dissection and without aneurysmal dilation. The only finding of significance to explain the rupture was minimal degenerative changes of cystic medial necrosis.

Etiologic factors concerned with rupture under such a circumstance are not known, but in addition to the minimal degenerative changes in the media, pre-existent hypertension with a secondary rise in intraluminal arterial pressure during the straining of extubation may have contributed to rupture.

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THE NASOLABIAL CHEEK FLAP

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The prominence of the nose, jutting out as it does from the face, subjects its integument to an abnormal amount of trauma and irritation, resulting in a high incidence of loss of tissue by accidental injury and malignant infiltration. Because of the very prominence of this facial feature, it is important that its defects be corrected to give the best possible cosmetic results. Small defects and lesions are obviously best handled by excision and primary closure, larger ones by the rotation or advancement of local tissue in the form of pedicled flaps or by the use of free grafts. In general, local tissue is most desirable because of its similarity of texture and color to the tissue which it is to replace.

When local tissue is used as a pedicled flap, defects of contour can also be corrected. The skin of the lower half of the nose, however, is rather inflexible, thereby limiting its use in this regard. Free full or split thickness grafts frequently introduce dissimilarities not only of texture and color (especially with the pigmentation which usually accompanies their use) but also of contour. This is especially noticeable when the underlying cartilage is resected in order to obtain a satisfactory margin beneath a malignancy. It is important that, if local tissue is used, it be sufficient for both reconstruction and for closure of the defect produced without incurring further disfigurement. The plan of reconstruction should be designed to attain one's end with the minimal extent and number of operative procedures and the least amount of secondary scarring or disfigurement.

In the reconstruction of nasal defects we feel sure that the nasolabial flap has been utilized for many years, but a review of the literature reveals a paucity of information on this subject. The nasolabial flap is well suited to the reconstruction of defects of the lower half of the nose. The texture and color of the tissues so used are similar to those of the nose and proper contour can be

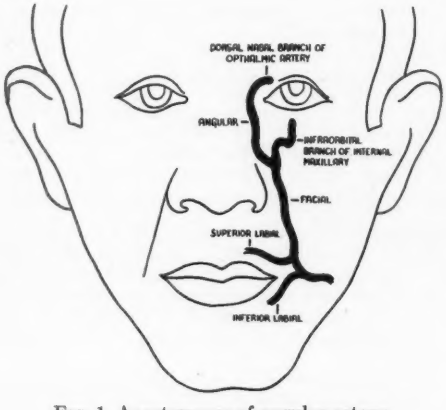

FIG. 1. Anastomoses of angular artery

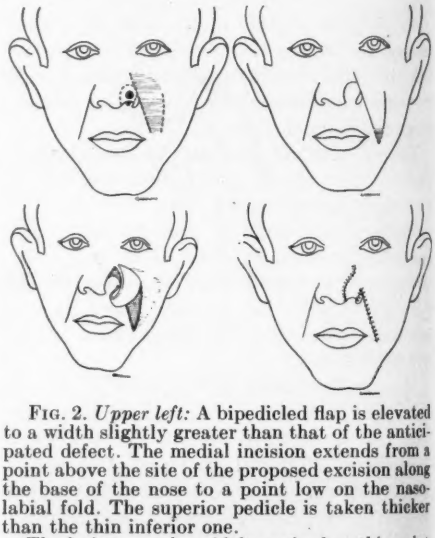

FIG. 2. *Upper left:* A bipedicled flap is elevated to a width slightly greater than that of the anticipated defect. The medial incision extends from a point above the site of the proposed excision along the base of the nose to a point low on the nasolabial fold. The superior pedicle is taken thicker than the thin inferior one.

The lesion may be widely excised at this point and mucosa sutured to the skin. If the extent of a neoplastic lesion is in doubt, reconstructive procedures should be deferred until the margins of the surgical specimen are seen to be adequate on histological examination.

Upper right: Two weeks later; the V-incision is made. This area only is elevated to secure division of the entire inferior pedicle.

Lower left: Two weeks later; the single pedicled flap based superiorly is elevated and the adjacent cheek widely undermined.

Lower right: The flap is folded upon itself and sutured to the nasal skin externally and to the nasal mucous membrane internally. The cheek defect is closed primarily.

FIG. 3. *Left:* A. L. B., a 35-year-old white woman (case 1), with basal cell carcinoma of the right side of the nose of one year's duration. *Right:* The mass was excised down to the mucous membrane and the defect corrected immediately by a single pedicled nasolabial flap.

FIG. 4. *Left:* H. S., a 45-year-old white woman (case 2), with a history of a growth on the skin of the nose of eight years' duration. The area was removed elsewhere with electrocautery two years prior to her first visit here, but gradually recurred. On examination the mass measured 1½ cm. in diameter and ¾ cm. in height, and was smooth and light yellow in color. *Right:* The area was excised widely and a single pedicled nasolabial flap rotated into the defect. The pathologic report was basal cell carcinoma with adequate margins.

FIG. 5. *Left:* G. A., a 48-year-old white man (case 3), had a history of difficulty in breathing following scar contracture of the right side of the nose secondary to full thickness lacerations of the nasal wall. *Right:* The scarred area was dissected free of the mucous membrane and a single pedicled nasolabial flap rotated into the defect. Defatting of the base was carried out at a later date.

FIG. 6. *Left:* L. C., a 16-year-old white boy (case 4), was involved in an automobile accident with resulting loss of the left ala, scarring of the cheek, and irregularity of the lip. A nasolabial flap was elevated in two stages. *Right:* In the third stage of the procedure the nasolabial flap was rotated into the defect and a Z-plastic carried out to avoid depression of the left apex of the nostril.

FIG. 7. *Left:* L. M., a 62-year-old white man (case 5) with persistent ulceration and erosion of the nose, was treated with x-ray and radium elsewhere. Treatment given here consisted of the elevation of a bipedicled flap with excision of the nasal lesion. Examination of the surgical specimen revealed basal cell carcinoma with adequate margins. *Right:* In the second stage of the procedure the inferior pedicled flap was divided and elevated. The flap was rotated into position with distal end folded upon itself to form a lining in the third stage.

effectively recreated. Large amounts of tissue are usually available from the cheek and the line of closure can be readily disguised in the normal nasolabial fold. This tissue is soft and flexible, well suited to reconstructive work. The operative procedures are of relatively small magnitude and few in number.

In addition to the advantages of the texture and color of the skin of this area, together with

its relative abundance, the anatomy is also favorable in regard to the blood supply. The main vessels run generally parallel to the long axis of this pedicled flap, the facial artery extending from the angle of the mouth along the side of the nose to the medial commissure of the eye as the angular artery. At its superior termination in the cheek it anastomoses with the infraorbital artery and, medial to the orbit, with the dorsal nasal branch of the ophthalmic artery. With the transection of the facial or angular artery in the course of the operative procedures, the anastomosis with the internal maxillary artery (infraorbital branch) and internal carotid artery (dorsal nasal branch of the ophthalmic artery) provide an excellent blood supply through the superior base of the flap. Although the venous return readily finds its way through the nasofrontal and ophthalmic veins, the lymphatics have no alternate routes to follow. For this reason, nasolabial flaps are apt to remain edematous for several months postoperatively (fig. 1).

FIG. 8. *Left:* L. A., a 53-year-old white woman (case 6), had a history of a "punched out" area on the right side of the nose, being excised in February, 1953. One year later recurrence was noted. This was cauterized and the resulting defect closed by primary suture. In December, 1954, a recurrence was again cauterized and she was referred to us for therapy. *Right:* After the bipedicled flap was elevated the nasal lesion was widely excised. At the third stage the tip blanched when rotated upon itself. Therefore it was left free and allowed to heal into position. At a fourth stage the tip was defatted and sutured into a better position. Pathologic report was basal cell carcinoma with adequate margins of excision.

In the treatment of malignant neoplasms the complete resection of the lesion is of primary importance. Where the extent of a large penetrating lesion is in doubt it is preferable to carry out only the excision in the initial procedure and defer reconstruction until after histologic examination of the surgical specimen. If, however, one is confident that the lesion can be readily encompassed, the bipedicled flap is elevated first and this area sutured. This prevents seeding of the cheek wound, should the neoplasm be transected in the initial procedure. Should such a transection of the malignancy occur following elevation of the bipedicled flap, the site of the residual carcinoma can be determined from the histologic study of the marked surgical specimen and further resection carried out. This may complicate the plan of reconstruction but is vastly

FIG. 9. *Right:* C. M., a 64-year-old white man (case 7), was seen regarding a lesion of the left side of the nose. This lesion had been present for a period of four years, subjected to repeated trauma. The mass gradually increased in size and punch biopsy was reported as basal cell carcinoma. *Left:* The mass was widely excised, removing almost the entire left side of the nose. A bipedicled nasolabial flap was prepared at the same time. The distal pedicle was transected and replaced at a second stage and in a third stage the flap was rotated into the defect. The tip was turned in to form the lining. The flap was subsequently defatted on two occasions under local anesthesia and the tip revised.

FIG. 10. *Left:* M. H., 58-year-old white woman (case 8), with basal cell carcinoma of the left side of the nose of 10 years' duration, previously treated with x-ray therapy. *Center:* The mass was excised down to the mucous membrane and a full thickness graft from the left upper arm sutured into the defect, following the elevation of a bipedicled nasolabial flap. The margins of the surgical specimen were seen to be adequate. *Right:* The inferior pedicle was divided and later the superior surface of the grafted area was excised and the nasolabial flap rotated into position to correct the contoural defect. In a final stage the base of the flap was returned to the cheek.

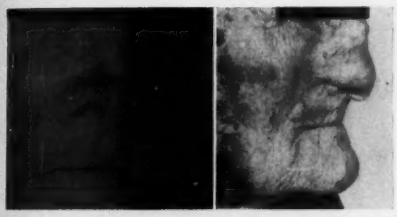

FIG. 11. *Left:* C. B. J., a 80-year-old white woman (case 9), had a history of an ulcerating area on the right side of the nose treated with two applications of radium. Recurrent ulceration was noted later and the area was again treated with radium six weeks before her first visit here. The ulcerating defect involving the entire tip of the nose extended down to the lateral and alar cartilages and into the right side of the nasal cavity. Punch biopsies were reported as basal cell carcinoma. *Right:* The entire tip of the nose was resected with the underlying septum and superior columella. A bipedicled right nasolabial flap was elevated and lined by a split thickness graft from the abdomen and then replaced. The interior end of the bipedicled flap was later divided and replaced. The lined nasolabial flap was elevated and the cheek lateral to this undermined and sutured along the nasolabial fold. The split graft lining was sutured to the mucous membrane of both lateral walls of the nasal fossae and to both sides of the septal mucosa. The base was defatted at a subsequent stage. The pathologic report was basal cell carcinoma with adequate margins.

preferable to inadequate or even harmful cancer surgery.

Nasolabial flaps may be used in a variety of ways depending on the extent of the defect to be corrected. Their use extends from small flaps rotated into the defect in one operative procedure to large delayed flaps which are to be folded upon themselves to provide for the entire reconstruction of the lower half of one side of the nose or lined with a split thickness graft in the repair of defects extending to the opposite side of the nose. A series of cases is presented to demonstrate the multiple applications of this procedure, together with a few technical points which may prove helpful (fig. 2).

SUMMARY

Reconstructive surgery of the lower half of the nose is frequently necessary to correct traumatic defects or loss of tissue associated with the resection of a malignancy. The nasolabial cheek flap is well suited for this purpose, providing satisfactory color, texture, and contour and being, usually, of satisfactory quantity. The vascular supply is reliable, the tissue soft and flexible, and the operative procedures of limited magnitude and number.

Where lining is present, the nasolabial cheek flap may be rotated immediately, but staged procedures to enhance the blood supply are preferable if the flap is to be folded upon itself to provide its own lining. In extensive defects extending to the opposite side of the nose, the flap may be lined with a split thickness graft which is later sutured to the nasal mucosa.

In cancer surgery a wide curative resection of the malignancy is of primary importance. Any compromise in this regard to facilitate reconstruc-

tion will be of but short lived benefit to the patient.

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HEMIPELVECTOMY: A PALLIATIVE PROCEDURE

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The hindquarter amputation was first performed by Kocher in 1884,[6] and next by Billroth in 1890.[3] It was first successfully performed in 1895 by Girard.[3] During the first half of the twentieth century this operation was often viewed as a form of surgical exhibitionism and "frequently considered so mutilating a procedure and of such forbidding magnitude as to be properly excluded from the category of acceptable surgical operations."[5]

By 1934 the total number of cases, as compiled by Gordon-Taylor and Wiles,[3] reached 84. The mortality rate was still over 50 per cent; but with the improved knowledge of blood replacement, electrolyte balance, anesthesia, antibiotics, and improvement in surgical technique, the mortality was lowered to approximately 15 per cent in 1950, and since that time there has been one series reported[1] of 14 cases without a mortality.

Indications for hemipelvectomy are:[7] (1) primary malignant osseous or periosteal tumors of the upper femur where the growth has extended to or through the hip joint, and similar tumors of the innominate bone; (2) large, primary malignant soft tissue tumors of the upper thigh (involving the hip joint or extending through the obturator foramen), groin, buttocks, pelvic parietes, or iliac region; (3) for palliative reasons, in instances of foul, infected or painful malignancies of the upper thigh and buttock areas; (4) malignancies located below the knee but with extension up to the pelvic lymphatics and no higher; (5) metastasis from carcinoma of the penis or rectum in selected cases; (6) in rare instances for aneurysm of femoral artery (also other vascular tumors), trauma, massive benign tumors of the pelvic bones, or soft tissues.

Technically, Ravitch[5] believes that performance of the hemipelvectomy is a simpler procedure than disarticulation of the hip joint, from the standpoint of the number of structures and muscle masses which have to be divided, and that the weight bearing stump is adequate.

Many performances of this operation for cure of the above mentioned primary malignancies have been reported. We would like to stress its value as a palliative treatment for painful, malodorous, draining types of lesions that could not be otherwise adequately cared for.

Of the two patients whose cases we report, one had a lesion which was painful; spontaneous hemorrhages had occurred, and the location of the lesion prevented any simpler procedure from being performed. In the second patient, there was a draining lesion at the inguinofemoral region; without operation, she would have had to remain in bed for the rest of her life.

CASE REPORTS

Case 1. In 1951, when 45 years of age, this woman had a brown to black mole removed from her left leg; at that time, it was found to be a malignant melanoma. A few months after its excision, a nodule appeared in the left inguinal region. At this time she saw another surgeon, who apparently discouraged her by telling her that it would have to be removed and that possibly the leg would have to be amputated. She refused treatment and sought no more medical treatment until June, 1953, when she entered The Wesley Long Hospital and an enlarged left inguinal node was excised. The pathologic report was malignant melanoma. No further treatment was advised at this time because the surgeon noted at operation that the malignant process had extended beyond the tumor mass.

During the course of the next three years, several large growths appeared on the left leg. One of these became ulcerated and painful and bled easily (fig. 1). The patient entered the hospital on February 29, 1956, seeking relief from the pain in the leg. Physical examination showed eyes, ears, nose and throat to be essentially negative. The neck showed no abnormal masses or pulsations and the chest and lungs were clear anteriorly and posteriorly. The heart examination indicated a normal sinus rhythm and no murmurs. In the abdomen no masses, tenderness, or rigidity were noted. There was a 7-cm. cauliflower mass, pedunculated and ulcerated (fig. 2), that seemed to arise from the left shin bone. There was also a mass 6 to 7 cm. in diameter on the medial aspect of the knee, containing bluish pigment. There were several smaller masses that lay along the course of the greater saphenous vein. There was moderate

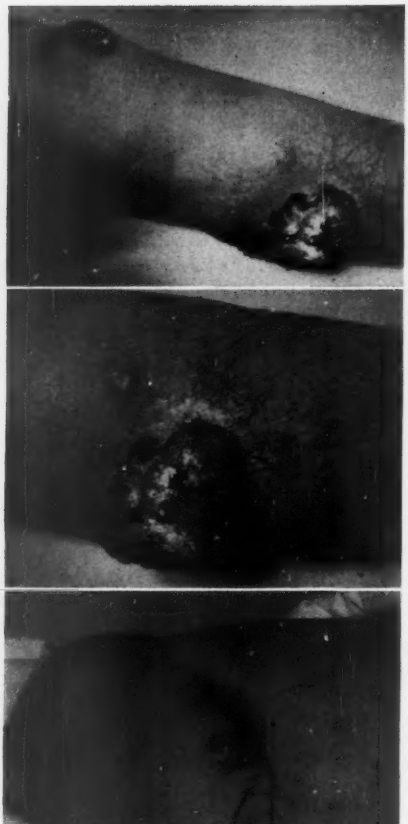

FIG. 1 (*top*). Multiple ulcerating polypoid growth from recurring malignant melanoma, 5 years after initial diagnosis.

FIG. 2 (*center*). Close-up of ulcerated lesion of left thigh where several spontaneous hemorrhages had occurred.

FIG. 3 (*bottom*). Amputation stump showing necrosis of central region of incision, 26 days after surgery.

swelling of the knee, with some tenderness of the leg and some tenderness on motion of the left knee. Impression was a recurrent, malignant melanoma of the leg. The results of the laboratory work were: hemoglobin, 11.5 gm.; white blood cells, 4,900; polymorphonuclear leukocytes, 74; lymphocytes, 22; monocytes, 4. Bleeding time and coagulation time were normal. Bromsulphalein retention test showed 6 per cent retention in 45 minutes. After two blood transfusions, the hemoglobin was 13 gm.

On March 5, 1956, the patient underwent a hemipelvectomy. An anterior approach was employed and the region of the common iliacs explored. A node was taken for biopsy. The frozen section showed no evidence of tumor in this node. Accordingly, the dissection was continued; the symphysis pubis was divided with a knife, and the sacroiliac with a mallet and chisel. After amputation hemostasis was obtained and two multiple perforated Robinson[3] catheters were inserted at the extremities of the incision. These were attached to negative pressure drainage. The patient received 2000 cc. of blood during the procedure, which lasted 1 hour and 50 minutes. She did very well postoperatively. Both drainage tubes were removed on the second postoperative day. She was walking with crutches 11 days after surgery and was discharged from the hospital 18 days after the operation. Her course since that time has been fairly gratifying. She now has freedom from pain and gets around well on crutches. She has no interest in obtaining a prosthesis. There is some evidence that this woman has recurrent tumor but the removal of this bleeding, foul-smelling, multiple ulcerating tumor formation of the left leg has enabled her to be much more comfortable (fig. 3).

Case 2. In August, 1954, a 57-year-old colored woman complained of an ulcer on the right leg. The ulcer, which had slowly increased in size, was the size of a half dollar. It was biopsied and found to be a malignant epithelioma. No lymph nodes were palpated, and only a local resection was performed by her surgeon. The pathologist interpreted this as a squamous cell epithelioma of the skin. She was discharged from the hospital on the third postoperative day. The wound healed without difficulty and convalescence was uneventful. She received no x-ray therapy.

In April, 1956, she was hospitalized with a mass in the right femoral triangle. She stated that it had been present for one month and had been draining for approximately two weeks.

Past history was negative, with the exception of lues several years ago; adequate treatment had eradicated that disease. She was known to have had diabetes for about a year, and was on low doses of insulin.

Physical examination revealed a well developed, well nourished woman who was not acutely ill. Head, eyes, ears, nose, and throat were essentially negative. Chest and lungs were clear anteriorly and posteriorly. The heart examination indicated a normal sinus rhythm and systolic murmur over the aortic region. The findings in the abdomen were negative except for the right lower quadrant; there was a smooth swelling with a small amount of drainage from below Poupart's ligament and

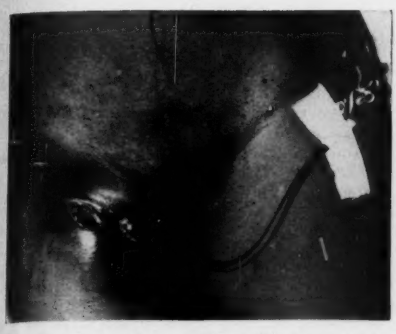

FIG. 4. Ulcerating, foul-smelling, metastatic lesion in inguinofemoral region, just prior to hemipelvectomy.

over the right femoral triangle (fig. 4). The mass was slightly tender and warm to palpation. The scar on the right lower leg was well healed. The results from the laboratory work were: x-rays of chest and abdomen essentially negative; urine, 4 plus sugar; blood sugar, 190; hemoglobin, 12 gm.; white blood cells, 6000 with a normal differential.

On May 4, 1956, a biopsy was performed and a diagnosis of metastatic malignancy was made. It was decided that a hemipelvectomy would be necessary to remove the ulcerating lesion (fig. 4). This was performed on May 14, 1956, using the technique described by Pack and others.[4]

A raquet type of incision was employed; the common iliac vessel was ligated at the bifurcation of the aorta. There were nodes present up to this area. The right common iliac vein was ligated at the junction with the left (venae cavae). We doubted that a cure had been effected, as nodes were palpable up to this level. The symphysis pubis was divided with a scalpel and the sacroiliac joint was cut with a Gigli saw. The operating time was 1 hour and 50 minutes, and the patient received 1500 cc. of blood during the surgery. Multiple perforated Robinson catheters[2] were placed in each extremity of the wound and negative suction was applied (fig. 5). She was returned to her room in good condition.

The drains were removed on about the sixth postoperative day. A mild wound infection prevented healing by first intention. A mild slough of the skin developed; this could have been due to the ligation of the internal iliac artery but we believed it to be due to fluid accumulation in the wound. Secondary closure of the wound was performed on June 29, 1956. The patient was able to be discharged from the hospital about 10 weeks after the initial surgery. Figure 6 shows the healed stump about four months after operation. The patient did not require any type of prosthesis and got around well on crutches. She was able to

FIG. 5 (*top*). Perforated Robinson catheters placed in wound to aspirate seepage and prevent dead space formation.

FIG. 6 (*bottom*). Four months after surgery. Well healed, painless stump. Central area of wound still shows effect of necrosis.

do all her own housework. Her only complaints were of phantom leg pain, and this was controlled by salicylates.

Ten months after surgery, the patient had a massive gastrointestinal hemorrhage and has since been in declining health.

SUMMARY

We believe that hemipelvectomy has now become a relatively safe procedure. With adequate blood replacement, this operation has a definite place in the palliative treatment of malignancies of the upper thigh and pelvis. No change from the previously reported surgical techniques other than that which has been described has been employed. In one case presented the common iliac artery was ligated; in the other, the external

iliac artery. Both had some necrosis of the wound margin. Negative suction drainage was employed in both cases; it was successful in one, but failed in the other to prevent hematoma formation with subsequent infection.

Both patients were ambulatory following their surgery, and on many occasions stated that they felt much better. The major untoward symptoms following surgery were phantom leg pains in one and symptoms suggesting early ulcerative colitis in the other. Both cases are alive at time of writing, 12 and 11 months, respectively, after surgery.

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ADENOMATOUS TUMORS OF THE COLON AND RECTUM: THE IMPORTANCE OF EARLY DETECTION AND TREATMENT

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The conscientious clinician must be ever watchful for the presence of adenomatous tumors of the colon and rectum. Sufficient data have accumulated to indicate their importance in early detection of malignancy and its possible prophylaxis. According to the vital statistics of the United States for 1954, over 35,000 persons died of cancer of the large bowel and rectum, corresponding to approximately 21 persons per 100,000. In comparison with other malignant lesions, colonic and rectal cancer was the number two killer in both men and women. At present, the two chief means of reducing these figures are early detection of malignancy and removal of premalignant growths. It is the intent of this paper to indicate the incidence of adenomatous tumors, to summarize some of the evidence incriminating these lesions, and to present a series of cases which clearly illustrates the importance of aggressive management. Since pathogenesis and morphology have been expertly presented by others[6, 8, 15] consideration of these aspects has not been undertaken.

GENERAL INCIDENCE OF ADENOMAS

The incidence of adenomatous tumors of the colon and rectum has been quoted in the literature as being as high as 69 per cent.[1] The figures depend upon whether living patients or autopsy material has been studied, and in the former, whether or not double contrast air studies of the large bowel have been carried out. Helwig[8] reported a 9.5 per cent incidence at necropsy. Further analysis revealed a 10.4 per cent incidence in white people against 2.7 per cent in Negroes. There was a fairly constant progressive increase with age above 30 years in both sexes. If only individuals over 30 years were considered, the figures rose to 16 per cent in white people and 3 per cent in Negroes. Multiple polyps were present in 41 per cent of men and 37 per cent of women. Adenomas occurred more frequently in other segments of the colon than in the rectum. The sigmoid colon was the most common site, and 80 per cent of all lesions were situated in the sigmoid and rectum.

Among the 20,847 routine sigmoidoscopic examinations reported from the Yates Memorial Clinic there was a 2.8 per cent incidence of adenomas.[16] Here, too, the incidence increased progressively with age. Eight per cent of their cases revealed multiple polyps. Raad observed a 1.63 per cent incidence in 8,502 routine sigmoidoscopic examinations with multiple polyps in 10 per cent of patients.[11] In a recent report from the Cancer Prevention Center of Chicago, analysis of findings from 50,000 cases of routine proctosigmoidoscopy revealed a 7.9 per cent incidence of polyps.[10] In view of the large series, this figure is no doubt more representative of the true incidence of adenomatous lesions in asymptomatic people.

RELATION OF ADENOMA TO CARCINOMA

Intensive clinical study has revealed the ultimately malignant character of a high proportion of adenomatous growths. In 1939, Shields Warren reported a series of over 800 cancers of the colon and rectum in which it was shown that 12 per cent had arisen in preexisting mucosal polyps.[13] Helwig noted a 7 per cent incidence of carcinoma in 139 cases of adenoma of the colon.[8] Westhues reported a 15 per cent, Smith,[12] a 26 per cent and Burns,[4] a 19 per cent incidence of carcinoma. Mayo described a series of 334 cases of adenocarcinomas of the colon and rectum in which 34 per cent had associated adenomas.[9] Westhues found adenomas in 45 per cent of his cases and Bacon,[2] in 31.2 per cent. In Bacon's series, 20 per cent of these associated lesions showed malignant changes.

The fact that adenomatous tumors undergo malignant change is well substantiated morphologically.[8, 12, 13] Transitional phases may be seen in the same polyp, with normal areas blending

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into zones showing epithelial hyperplasia, atypism, carcinoma *in situ* or invasive adenocarcinoma. The average age incidence of polyps is approximately 10 to 12 years,[3, 14] earlier than that of cancer, and both lesions are similarly situated anatomically. Also of significance is the infrequency of both lesions in the negro race.

CLINICAL SERIES

The series to be presented consists of patients observed by one of us (A. H.) from February 1, 1949, to October 1, 1957. Patients appeared because of rectal bleeding, diarrhea, crampy abdominal pains, and other symptoms, or because polyps were detected during routine sigmoidoscopic examination. A total of 777 sigmoidoscopic examinations were performed, and in nearly all cases a barium enema with air contrast studies of the large bowel was included.

METHOD OF EXAMINATION

After careful physical examination, patients scheduled for investigation were instructed in proper preparation of the rectum and large bowel. A mild cathartic was taken the afternoon prior to examination and followed the next morning by cleansing enemas of saline solution. A Phospho-soda enema in a disposable unit was administered one hour before the examination.

If a polyp was found it was removed by snare if pedunculated, or with biopsy forceps if sessile. The remnant was fulgurated. Minute mucosal excrescences were fulgurated. All specimens were examined microscopically. The patient was reexamined one week later and, if healing was satisfactory, he was referred for barium enema with air contrast studies. Roentgenologic studies were also ordered whenever sigmoidoscopy did not reveal the cause of the patient's complaints. Discovery of polyps higher in the large bowel always warranted repeat x-ray examination, preferably carried out by a different examiner. When the diagnosis of colonic polyps was confirmed, the patient was hospitalized and prepared for exploratory laparotomy. The above routine has proved effective for investigation of the large bowel and constitutes an integral part of our patient management.

RESULTS

A total of 188 patients (24.2 per cent) had polyps. The ratio of males to females was 1.4:1.

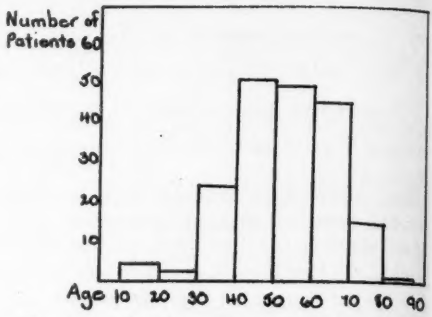

FIG. 1. Age incidence of polyps of the colon and rectum in 161 patients.

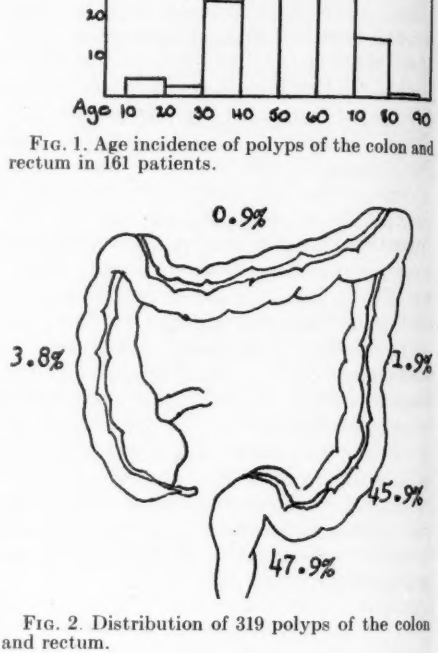

FIG. 2. Distribution of 319 polyps of the colon and rectum.

TABLE 1

Presenting symptoms—188 patients

	Number	Per Cent
Bleeding	98	52.1
Abdominal pain	11	5.9
Diarrhea	6	3.2
Constipation	4	2.1
Follow-up duodenal ulcer	1	0.5
Gluteal abscess	1	0.5
Asymptomatic	35	18.6
Not stated	32	17.1

The average age was 52.4 years, ranging from 12 to 85 years, and the largest proportion was in the fifth decade of life (fig. 1). Fifty-nine patients (31.4 per cent) had multiple polyps. The lesions varied from a few millimeters to 5.0 cm. in diameter, some being suspended on a pedicle several

TABLE 2
Treatment

	Number of Procedures	Number of Polyps Resected
Biopsy and fulguration	69	105
Excised through anal canal	4	4
Colotomy and local excision	29	39
Exploratory laparotomy*	1	0
Segmental resection	3	2
Posterior resection	1	1
Hemicolectomy	2	9
Abdominoperineal resection	3	1
Fulguration	100	158
Total	212	319

* Sigmoid polyp palpated but not resected because of simultaneous finding of metastatic adenocarcinoma in the liver from a primary gall bladder tumor.

centimeters long while others were sessile. Ninety-three per cent of the polyps were situated in the sigmoidal portion of the colon and the rectum (fig. 2). Rectal bleeding was the most common sign (table 1). Thirty-five patients were asymptomatic, and polyps were detected during routine examinations. In one case a colonic adenoma was discovered by roentgenologic studies following surgery for a duodenal ulcer, and in another patient with a gluteal abscess, a rectal polyp was found.

TREATMENT

Very small sessile lesions several millimeters in diameter were usually fulgurated through the sigmoidoscope (table 2). Approximately one-third of the lesions were treated in this manner. Large lesions were biopsied, and this was followed by fulguration of the remnant. Four pedunculated rectal polyps close to the pectinate line were excised and the base was sutured through the anal canal. Tumors that could not be visualized or treated adequately through the sigmoidoscope or which were situated above the peritoneal reflection were treated by exploration through an anterior abdominal incision. Colotomy and coloscopy during the operation, frequently utilizing multiple incisions, were carried out. Thirty-nine pedunculated polyps were excised locally (figs. 3 and 4), and two broad based polyps were removed by segmental resection. Left hemicolectomy was

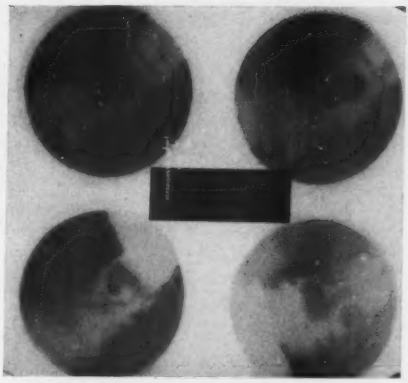

FIG. 3. Barium enema with air contrast studies outlining a pedunculated polyp in the sigmoid colon (spot film).

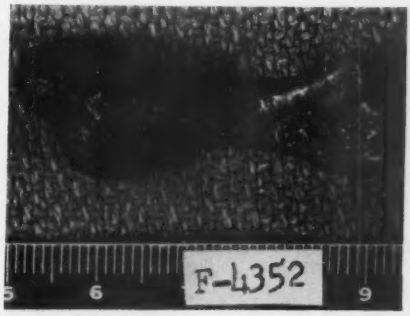

FIG. 4. Gross specimen showing the extent of surgical excision. Microscopic examination revealed a benign adenoma.

done in one case in which three primary adenocarcinomas were found in addition to two benign pedunculated polyps (fig. 5). Only three villous tumors of the rectum were encountered. One was treated by wide excision through a posterior approach, and the other two by abdominoperineal resection because microscopic examination revealed foci of invasive adenocarcinoma. A third abdominoperineal resection was performed in a case of primary adenocarcinoma of the rectum in addition to a benign adenoma.

In this series one episode of severe bleeding occurred following biopsy and fulguration through the sigmoidoscope. The vast majority of fulgurations were carried out in the office. Whenever difficulty was anticipated, the procedure was performed in the hospital. No bowel perforations or explosions occurred. The postoperative course following colotomy and coloscopy was uneventful in all cases.

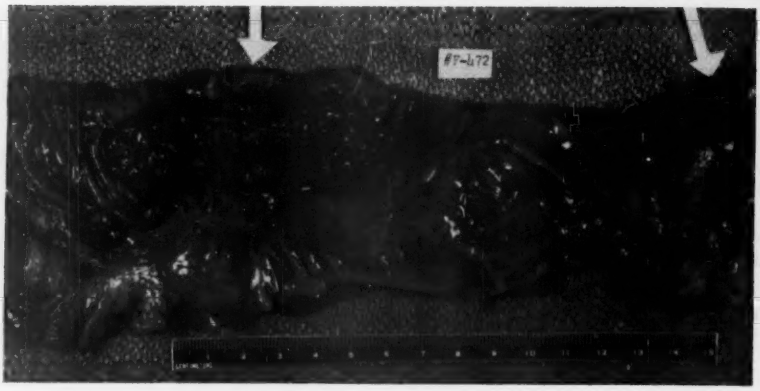

FIG. 5. Part of gross specimen showing an adenomatous polyp in proximity to a carcinoma of the descending colon.

TABLE 3

Histologic findings

	No.	
Benign adenomatous polyp	127	
Atypia		29
Adenocarcinoma *in situ*	16	
Adenocarcinoma	16	
Total	159	
Leiomyoma		1
Pyogenic granuloma		1

TABLE 4

Follow-up study—74 patients

Initial Treatment	No. of Patients	Cases of Recurrent Polyps	Time of Recurrence	Subsequent Carcinoma
			yr.	
Fulguration	21	4	2, 2, 4, 6	Urinary bladder —3 yr.
Biopsy and fulguration	30	5	1, 1, 1, 2, 6	
Colotomy or hemicolectomy	23	4	1, 1, 2, 5	Transverse colon—2 yr.

HISTOLOGIC FINDINGS

A total of 161 polyps was studied histologically (table 3). One was found to be a leiomyoma and another a pyogenic granuloma. Of 159 true adenomatous tumors, 127 (79.8 per cent) were found to be benign; however, 29 (22.8 per cent) of these showed atypical hyperplasia. Adenocarcinoma *in situ* was present in 16 polyps (10.1 per cent) and invasive carcinoma in 16 (10.1 per cent).

FOLLOW-UP

Numerous patients were either entirely lost to follow-up study or are being seen by the referring physician. In 74 patients adequately observed for periods ranging up to eight years (table 4) the development of other adenomatous polyps was 17.6 per cent. One patient subsequently developed a primary carcinoma of the transverse colon and another developed a carcinoma of the urinary bladder. Two of three patients treated by abdominoperineal resection have no evidence of recurrent carcinoma or polyps two and three years after operation. Two patients died within one and three years respectively from metastasis.

DISCUSSION

The mean and average age incidence agrees with general experience. However, the absence of a progressively increasing incidence in successive decades is not readily explained.

With the exception of minute hyperplastic foci which were fulgurated, all lesions were biopsied. Since carcinomatous changes may occur at the periphery, stalk or base of a polyp, an effort was always made to obtain specimens adequate for

thorough histologic studies. One patient in whom biopsy revealed adenocarcinoma had a segmental resection which subsequently revealed no residual carcinoma and negative lymph nodes. In three instances where roentgenologic studies strongly suggested the presence of a polyp, colotomy and coloscopy did not reveal their presence. Coloscopy was generally performed proximally and distally to each colonic lesion, and frequently coloscopy was performed through multiple incisions in order to rule out lesions in other portions of the colon.[8] Longitudinal segmental incisions, as advocated by Gants,[7] were not used.

Small polyps, probably in an early stage of development, detected by sigmoidoscopic examination, were less likely to be malignant. Usually those which were larger showed malignant changes. These findings corroborate those of other investigators[5, 14, 16] and indicate an apparent direct relationship between the size of the lesion and the incidence of malignancy. Nevertheless, it is desirable to biopsy even the minutest lesions prior to fulguration.

The presence of atypia in 29 of 107 benign adenomas probably represents a transitional phase in the development of malignancy which would probably have materialized had not extirpation been carried out. The occurrence of carcinoma *in si'u* (10.1 per cent) and frank invasive adenocarcinoma (10.1 per cent) corresponds with the findings of others. A supplementary study has subsequently been made of all cases treated surgically for primary rectal or colonic cancer. Of 83 cases, 29 patients (34.9 per cent) had associated polyps. These findings are similar to those of Mayo and Bacon.

The management of cases in which multiple polyps are found has recently provoked much discussion among surgeons. Thus far, we have hesitated to perform total colectomy. Instead, we have leaned towards conservatism and have favored hemicolectomy only. However, if one subscribes to the concept of the tendency to develop new colonic and rectal adenomas and their possible malignant transformation, total colectomy should be the procedure of choice. It may well be that continued follow-up studies of our cases will eventually indicate that the radical approach is more rational and in the best interests of the patient. A more detailed knowledge of the incidence of recurrence of adenomas or the subsequent development of carcinoma is required before authentic opinions can be formulated.

Regardless of the method of treatment, regular long term follow-up studies in all cases are mandatory. Sigmoidoscopic examinations at three-month intervals during the first year and six-month intervals afterwards are the schedule frequently recommended. Most clinicians suggest repeat x-rays after one year and every two years afterwards, or sooner, should bowel symptoms develop. The question of radiation hazard remains unsettled. However, in young people it should be carefully considered if genetic and somatic injury from accumulative exposure is to be avoided.

SUMMARY

1. The peak incidence of adenomatous tumors of the colon and rectum occurs in the fifth decade of life.

2. In 31.4 per cent of patients the polyps were multiple.

3. The lesions varied from a few millimeters up to 5 cm. in diameter, and 93.4 per cent were present in the rectum and sigmoid colon.

4. Rectal bleeding was the most common presenting complaint (52.1 per cent).

5. Eighteen per cent of the patients were asymptomatic.

6. All adenomatous polyps biopsied were excised *in toto*, permitting adequate histologic study at various levels—base, stalk and periphery.

7. Ten per cent of adenomas showed foci of carcinoma *in situ* and 10 per cent, invasive adenocarcinoma. In addition, 23 per cent of benign tumors showed atypical hyperplasia.

8. The development of other adenomatous polyps was 17.6 per cent in 74 patients followed for varying periods up to eight years.

9. A supplemental study of cases treated for primary carcinoma of the colon and rectum revealed associated adenomas in 34.9 per cent.

CONCLUSIONS

1. In view of the potentially malignant nature of adenomatous tumors (polyps) of the large bowel, early detection and excision of all lesions are essential if the incidence and mortality rate of carcinoma of the colon and rectum are to be lowered. Aggressive management of patients with polyps may well prevent the development of cancers subsequently.

2. Sigmoidoscopy should constitute an integral part of any routine examination if persons harboring asymptomatic lesions are to be discovered.

3. Thorough investigation of all bowel complaints is imperative, particularly if rectal bleeding is present. Investigation is incomplete without sigmoidoscopy and barium enema with air contrast roentgenologic studies.

4. Since a significant number of patients develops new or recurrent polyps, periodic sigmoidoscopic and roentgenologic examination at yearly intervals or more frequently for at least five years is mandatory.

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EXPERIMENTAL STUDY OF HETEROLOGOUS AORTIC AND HOMOLOGOUS TRACHEAL GRAFTS TO BRIDGE ESOPHAGEAL DEFECTS*

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Short esophageal defects can often be bridged by direct anastomosis after mobilizing the proximal and distal segments. Longer segments have been successfully replaced by the use of the stomach, jejunum, colon and skin. Each method, however, has certain disadvantages. There can be no doubt that the interpolation of a suitable free graft or prosthesis would simplify operative restoration of esophageal continuity. Plastic prostheses have had some success experimentally and clinically, but their use has sometimes been attended by discouraging complications. Guidice and Tavano[3] have reported success in a few experiments in which very short autogenous tracheal segments were used as an esophageal prosthesis. We have found no reports dealing with the use of tracheal homografts or heterografts. The reports concerning use of homologous and heterologous aortic grafts for esophageal replacement have been far from satisfactory.[4, 6] It was the purpose of this study to investigate the experimental utilization of preserved homologous tracheal grafts and preserved heterologous aortic grafts for esophageal replacement.

MATERIALS AND METHODS

Healthy mongrel dogs weighing between 8.3 and 18 kg. were used. Food and water were withheld for at least 8 hours prior to surgery. Anesthesia was induced by the intravenous administration of thiopental sodium, tracheal intubation was carried out, and anesthesia was then continued by means of an intermittent insufflation of pure oxygen or, when needed, a mixture of oxygen and ether. Operation was carried out with aseptic technique. A left thoracotomy through the seventh interspace was performed. The mediastinal pleura was carefully dissected free from the esophagus and the pleural flaps were preserved so they could be sutured together over the graft at the completion of the procedure. If a laceration occurred in the mediastinal pleura of the right chest, it was immediately repaired with interrupted 4-0 silk sutures. A segment of the lower half of the esophagus measuring 4 to 6 cm. in length was resected and replaced with one of two types of grafts preserved in 70 per cent by weight alcohol. In 4 dogs homologous tracheal grafts were utilized, while in 26 the defect was bridged with heterologous cow aortic grafts.

The anastomosis was accomplished by the technique described by Battersby and King.[1] The lower anastomosis was accomplished first. By means of four interrupted 3-0 silk sutures, the graft was drawn into the esophagus (fig. 1). Then, depending upon the size of the lumen, 4 to 8 more similar sutures were placed. A continuous suture of 4-0 arterial silk was then used to affix the edge of the esophagus snugly to the graft. The cephalad anastomosis was carried out with the position of the graft and esophagus reversed, the esophagus being pulled into the graft by interrupted everting mattress sutures, thus creating a funnel like continuity. In all dogs a solution of penicillin and streptomycin was introduced into the area of dissection, and after the pleural flaps were closed over the reconstructed esophagus, the chest wall was repaired in layers without drainage.

Only water was given by mouth until the third postoperative day when milk was added, except in the case of a few dogs to which solid foods were inadvertently given as early as the first postoperative day. By the sixth or seventh day the diet was supplemented with ground meat. For the first three postoperative days 300,000 units of penicillin were given intramuscularly.

* From the Department of Surgery, Indiana University School of Medicine, Indianapolis, Indiana. Aided by a contract between the Office of Naval Research, the United States Navy, and Indiana University, and a grant from the James Whitcomb Riley Memorial Association.

RESULTS

Three of the 4 homologous tracheal grafts developed rapid degeneration of the membranous portion, resulting in death from empyema in 2, 7 and 10 days respectively. The animal which died on the second postoperative day was inadvertently given solid food the evening following operation. The remaining animal survived for 25 days before it died with mediastinitis. Postmortem examination revealed the tracheal graft to be intact and reinforced with connective tissue growth. There was some mild infection limited entirely within the mediastinal pleura. There was moderate stenosis at the site of the graft, the lumen of the graft being approximately 6 to 8 mm. in diameter.

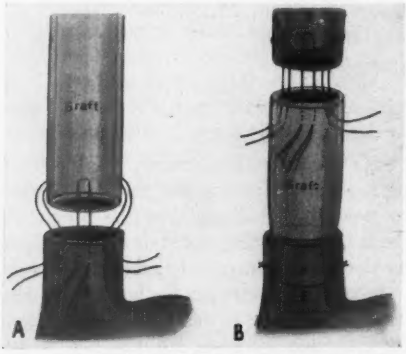

FIG. 1. Drawings illustrating the methods of invaginating the graft into the distal esophageal segment (*A*) and of invaginating the proximal esophagus into the graft (*B*).

The results were also rather generally poor with the heterologous aortic grafts. Leakage at the site of the anastomosis and resultant empyema were responsible for the death of twelve animals. The survival time varied from 3 to 42 days. Eleven of the twelve died within 8 days of surgery. Postmortem study revealed no stenosis in any of these dogs.

Pneumonia was the immediate cause of death in six additional animals. They expired in from 5

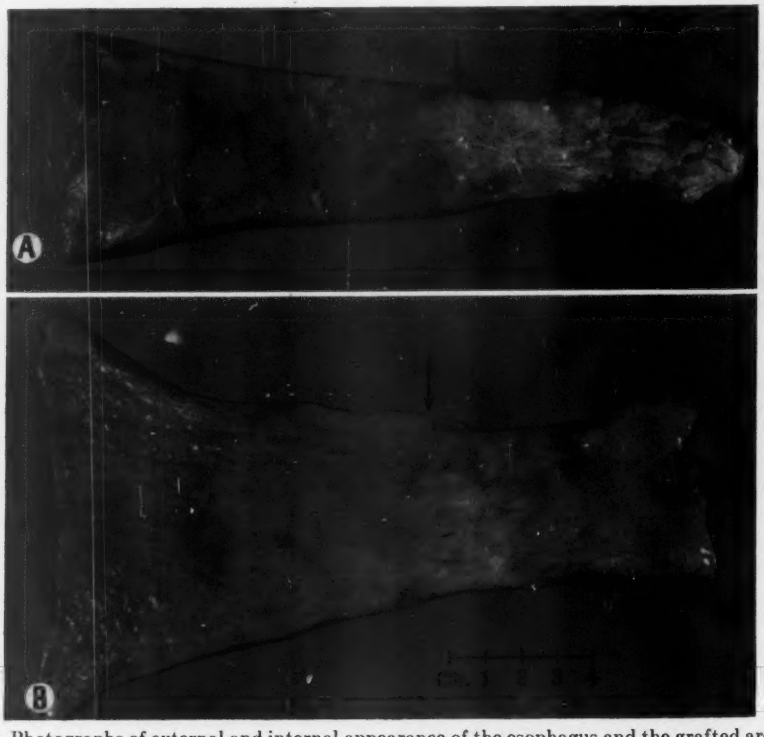

FIG. 2. Photographs of external and internal appearance of the esophagus and the grafted area in dog 459, 129 days after operation.

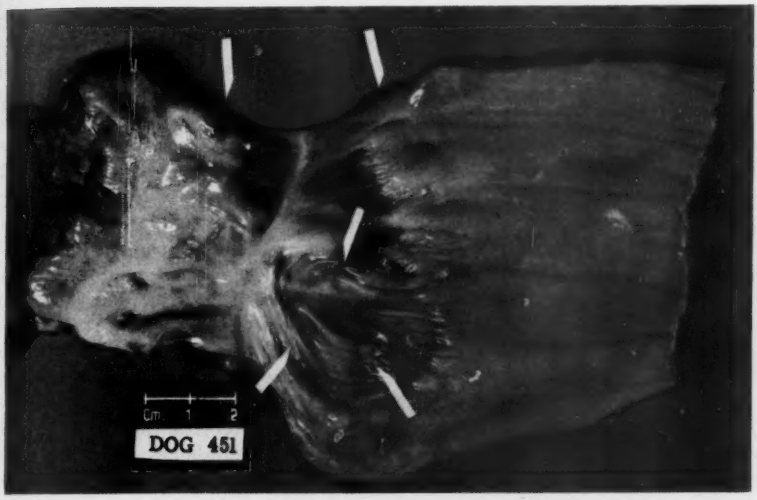

FIG. 3. Photograph of esophagus, including grafted area, in dog 451, 253 days after operation.

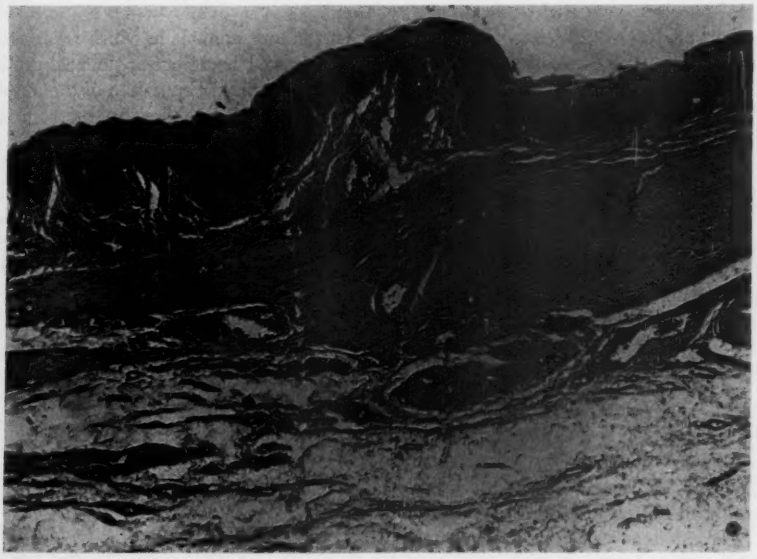

FIG. 4. Photomicrograph of point of union of graft and host esophagus in dog 451. The remains of the graft are covered with a well developed layer of stratified squamous epithelium.

to 38 days following operation, and five of the six lived at least 24 days. In three of them considerable stenosis was evident, and though the esophagus was still somewhat patent, the animals were emaciated. In one animal there was a low grade mediastinitis. In still another there was microscopic evidence of mediastinal inflammation in spite of absence of gross evidence of any inflammation.

Four animals apparently died as the result of emaciation consequent to a marked esophageal stenosis and difficulty with swallowing. They survived 20, 30, 42 and 124 days respectively. The difficulty in swallowing was first noticed

from the tenth to the twentieth day after operation. There was no gross evidence of infection noted in any of these animals at postmortem study, but in one animal microscopic examination revealed a low grade intramural infection. There was no leakage from the line of anastomosis in any of these animals.

Of the four remaining animals, one died of mediastinitis associated with some stenosis and partial obstruction 61 days after operation. One was lost from the colony some time after 60 days' survival. Another died suddenly without apparent cause 129 days postoperatively. At autopsy the graft was no longer grossly identifiable, though the area in which it had been inserted was now thin and the proximal esophagus was dilated (fig. 2). The graft and esophagus were firmly united by fibrous tissue. The remains of the graft were still intact and a small number of stainable nuclei were demonstrable. Fragments of elastic tissue could be identified with elastic tissue stain. There was very slight inflammatory reaction and no evidence of infection. The fourth animal was sacrificed 253 days after insertion of the graft. He had been eating well and was well nourished and apparently healthy. At postmortem study there was no gross evidence of the original graft (fig. 3). The distal anastomosis was slightly stenotic and the area which had been replaced by the graft was very thin and transparent. In one region a pulsion diverticulum had formed. There was a layer of stratified squamous epithelium covering the original graft (fig. 4).

DISCUSSION

It was hoped that the thick cow's aorta might prove a satisfactory free graft for esophageal replacement, providing sufficient pliability to permit a leak tight anastomosis, slow enough disintegration to permit the host to lay down a new mucosa-lined fibrous esophagus, and rigidity enough to prevent stenosis. These hopes were not realized. There was a relatively high incidence of leakage through the line of anastomosis and a lesser but significant incidence of stenosis. Gross or microscopic evidence of infection was noted in some. In animals surviving a relatively long time the proximal esophagus was dilated even when a relative stenosis was not grossly evident. A small pulsion diverticulum developed in the thin esophagus at the site of the graft in the longest survivor. In those animals which lived fairly long, there was a good mucosal lining of the fibrous esophagus at the graft site.

Sewell and Koth had previously studied the fate of freeze dried heterologous aortic grafts when used to replace segments of the esophagus in five dogs. One which was sacrified five weeks after operation had a severe stenosis. The other four died in from three to six days from leakage through the graft, primarily through its central portion. We did not observe this complication. When leakage was noted in our animals, it occurred through the suture line and the graft was intact. Somewhat better but still rather unsatisfactory results were described by Javid who used homologous aortic segments, either fresh or preserved, in buffered saline solution. Though 8 of 14 dogs survived from three to eight months and had an adequate lumen on barium swallow, six animals were lost. Two of the deaths were thought due to technical errors, three died of leakage at the line of anastomosis, and one died of obstruction.

Of the four animals in which we inserted alcohol preserved homologous tracheal grafts, three died from rapid degeneration of the membranous portion. The fourth had an intact graft, reinforced by connective tissue proliferation, and some mediastinal infection at the time of death 25 days after operation.

We have found no recorded data of other work with preserved tracheal grafts. Guidice and Tavano reported successful use of very short autogenous tracheal segments as cervical esophageal grafts in six dogs.

A number of investigators have studied homologous esophageal grafts for bridging esophageal defects. Skinner and his associates[7] found that esophageal stenosis occurred in almost all those animals which did not die early from rupture of the suture line. Pate and Sawyer[5] used freeze dried esophageal grafts. Rupture at the suture lines occurred in two of their five dogs, while the remaining three developed obstructive cicatrization. Fiaccavento,[2] on the other hand, reported success with esophageal grafts preserved in Gross' solution.

From our own studies and those of others it seems evident that free grafts of homologous or heterologous tissues have not proved superior to plastic prostheses. It is also clear that plastic prostheses have not given as good results as are obtained from the use of autogenous segments of

stomach, colon, and jejunum bearing their own blood supply.

SUMMARY

Experiments are reported concerning the fate of alcohol preserved homologous trachea and heterologous aorta when used to bridge esophageal defects of dogs. Such grafts proved unsatisfactory.

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CARCINOMA OF THE STOMACH DEVELOPING AFTER SURGERY FOR DUODENAL ULCER

Case Report

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The patient who encounters difficulty some years after a symptom free period, following gastroenterostomy or subtotal gastric resection for duodenal ulcer, places a diagnostic burden on the attending surgeon. It should be the obligation of the surgeon to disprove the presence of malignancy in such a situation as well as to make an accurate diagnosis. Presentation of such a case, with review of the recent literature, follows.

CASE REPORT

Case 1. C. H. F., a 65-year-old white man, had epigastric pain of about two weeks' duration with onset at the time of noting a somewhat tender lump in the upper abdomen. Although his appetite had been good, he had a weight loss of 15 pounds in the four to six months prior to admission and had also been constipated during the same period. The latter condition was controlled by milk of magnesia. No nausea or vomiting was present; no tarry or bloody stools were noted.

The patient's past history included closure of perforated peptic ulcer in 1929 and, in 1931, gastroenterostomy for duodenal ulcer. The only significant finding in the current physical examination was the suggestion of a palpable mass in the epigastrium. Laboratory findings indicated normal serum protein; fecal studies, negative for blood; hemoglobin, 8.68 gm.; gastric acidity absent, free HCl, total acid, was 58 units. In addition a gastrointestinal series revealed multiple filling defects involving a large part of the stomach and extending from the junction of the corpus and the fundus to the duodenal bulb. A well functioning gastrojejunostomy was present.

Adenocarcinoma of the stomach was suspected, and the patient was subjected to laparotomy with subtotal gastric resection on March 26, 1953. A tumor mass involving the lesser curvature of the stomach, partially circumscribing it and extending down to the pylorus was found. It was 10 cm. in diameter and appeared ulcerated and polypoid. No positive nodes were found nor did sections from the gastroenterostomy site show any evidence of tumor. When last contacted on May 28, 1957, the patient was living and well.

INCIDENCE OF CARCINOMA OF THE STOMACH IN PATIENTS WITH DUODENAL ULCER

Carcinoma of the stomach is more common in those patients having had gastroenterostomy for gastric ulcer than for duodenal ulcer.[20] Since the incidence of gastric carcinoma as a cause of death is about 3 per cent, it would appear that patients with duodenal ulcer are less prone to develop carcinoma of the stomach than those without it.[15] Fischer found only 1 of 938 duodenal ulcer patients to have gastric malignancy (0.1 per cent).[8] It is not felt, however, that these statistics should be the basis for concluding that carcinoma of the stomach may be of less frequent occurrence in patients having had surgical procedures for duodenal ulcer.

Balfour, in 1932, reported 500 cases of gastroenterostomy performed in 1918–19 in which there were 21 deaths within five years following surgery but none from cancer.[1]

This is not a definitive discussion of the etiology of gastric cancer; however it is the authors' desire to point out some of the most frequently associated factors. Among these is gastric anacidity. It will be noted in table 1 that in four of the five cases where such was recorded, free acid was absent. Berkson and his associates, in a 15-year follow-up of 1,058 patients with achlorhydria (221 of whom had pernicious anemia) among whom there were 26 deaths from carcinoma of the stomach, concluded, "... it seems not unreasonable to accept the presumptive conclusion that in persons with low gastric acidity or pernicious anemia, the probability of occurrence of gastric cancer is greater than in persons with normal acidity."[4]

Norcross and his associates[17] found the incidence of carcinoma of the stomach in pernicious anemia to be 1.1 per cent in their series of 341 cases which they followed for an average of 5.9 years. An incidence of 0.16 to 12.3 per cent in pernicious anemia was noted by the same author in reviewing the literature.

TABLE 1*

Author	Age	Sex	Original Operation	Interval	Free Acid	Site of Lesion at Second Operation
				yr.		
Hurst and Stewart	—	—	Gastroenterostomy	17		Stoma
Singer	52	m	Gastroenterostomy	12	0	Surrounding ¾ of stoma
Ransom	49	m	Exclusion operation	7	0	Distal ½ stomach and stoma
Prinz	55	m	Billroth II	10		Stoma
	57	m	Gastroenterostomy	20		Stoma
Milone	63	f	Gastroenterostomy	14		Stoma
Giovannini	49	m	Polya–Reichel	10		Stoma and lesser curvature
Montanari	37	m	Polya–Reichel	4		Surrounding ⅔ of stoma
Visintin	55	m	Polya–Balfour	19		Stoma and jejunum
Orringer	48	m	Gastroenterostomy	5		Stomach and invading stoma
	60	f	Gastroenterostomy	40		Stomach and invading stoma
	61	m	Gastroenterostomy	17		Stomach and invading stoma
Debray *et al.*	60	m	Resection	4		Stoma to post. cardia
Ruchensteiner	49	m	Billroth II	27		Stoma region
diDomizio and Costa	46	m	Resection	4		Stoma and gastric stump
	—	m	Gastroenterostomy	21		Surrounding stoma
Kyrle and Wild	42	f	Billroth II	19		Stoma and gastric stump
Medici	46	m	Gastroenterostomy	5		Stoma
Maloney and Stiennon	60	f	Gastroentersotomy	33	—	½ stoma and greater curvature
Dalseth	47	m	Resection	20		Stoma and gastric stump
	69	m	Resection	20		Stoma and jejunum
Leren	36	f	Resection	16		Stoma and gastric stump
Stirrett and Beal	64	m	Gastroenterostomy	28	—	Stoma and stomach
Freedman and Berne	67	m	Gastroenterostomy	26		Stoma
Epstein and Mendell	54	m	Gastroenterostomy	22		Antrum
	60	m	Gastroenterostomy	36	+	Pyloric end of stomach
Helsingen and Hillestad	66	m	Partial gastrectomy	26	0	—
McCall, Selecman and Arnspiger	65	m	Gastroenterostomy	24	0	Lesser curvature to pylorus

* Adapted from references [7, 9, 12, 18]

When the number of cases rendered anacid by gastric surgery is considered it would seem that anacidity has no clear etiologic relationship to the development of gastric cancer in the group of patients herein discussed. The age and sex incidence in these few cases parallel that seen in carcinoma of the stomach.

Freedman and Berne[9] theorize that some of the following may play a part in the origin of stomach carcinoma: (1) chronic inflammatory changes; (2) achlorhydria, local trauma, possible degeneration of the scar at the anastomosis; (3) polypoid change in gastric mucosa; (4) malignant degeneration of benign gastrojejunal ulcer; (5) coincidental.

Helsingen and Hillestad enumerated several factors which they believed might promote cancer development in the resected stomach.[12] They considered that the anacid atrophic-hypertrophic gastritis resulting from (1) impairment or abolition of acid production; (2) alteration of emptying processes; or (3) abnormal communication with the intestine with resultant regurgitation of alkaline fluid into the stomach might be the foundation for subsequent cancer.

SYMPTOMS

Unfortunately for both clinician and patient, malignancy occurring after surgery for duodenal ulcer may masquerade as a marginal ulcer. Gray

and Lofgren call attention to the fact that gastric cancer can be concealed only to be revealed at the time of surgery for marginal ulcer.[10]

Certainly the pain, hemorrhage and vomiting are symptoms which may occur in a carcinoma of the stomach after surgery as well as in marginal ulcer. However, symptoms may be of a relatively benign character and thus add to the difficulty of diagnosis.

DIAGNOSIS

The age-sex ranges in carcinoma of the stomach, marginal ulcer, and carcinoma of the stomach after surgery for duodenal ulcer are not markedly different.

The interval between first and second operative procedures in marginal ulcer and carcinoma of the stomach after surgery for duodenal ulcer shows the average interval to be greater in the latter condition, being 18 years as opposed to 3.7 years mean interval after gastric resection and 11.2 years after gastroenterostomy (table 1).[25]

The difficulty in x-ray diagnosis of marginal ulcer is well known. One might consider the routine performance of x-ray gastrointestinal series following gastric resection in order that the radiologist be provided with a "normal" film for reference in the event of future difficulty.

Gastroscopy is of value in determining the presence of ulceration or neoplasm.

Zoller and his associates report a case in which malignancy at the stoma was discovered seven months following transthoracic vagotomy.[29]

PROGNOSIS

In discussing the coexistence of duodenal ulcer and gastric malignancy, Fischer and his colleagues concluded that ulcer patients are stomach conscious by virtue of their condition and hence, consult their physicians early when confronted by new, different or recurrent symptoms. This, they believed, explains a higher survival rate in this group.[8]

Similar factors are most assuredly present in the type of case herein reported. In addition the level of the lesion has its bearing on prognosis. Near or at the stoma, it often produces symptoms more severe than vague dyspepsia and obstruction of the gastric outlet makes the patient seek treatment early. Also the level of the lesion, particularly when only gastroenterostomy has been performed, allows adequate stomach margin above for curative resection. It may be, too, that the usual mode of carcinoma spread is altered by the previous performance of surgery.

DISCUSSION

Twenty-six well documented cases are recorded in the recent literature, to which the case reported herein is added. Although the review at hand does not purport to be a complete summary of the world literature, it does illustrate the low incidence of occurrence of carcinoma of the stomach following surgery for duodenal ulcer.

Cases in which the original condition was described as "pyloric" or "peptic" or "prepyloric" have been excluded. Grosjean described the only recorded case (to 1948) of carcinoma on the jejunal side of the stoma.[11] This has not been included in table 1 as the description of the original condition for which the gastroenterostomy was performed does not clearly indicate that it was a duodenal ulcer.

Only 5 of the 27 cases had a second operation within five years or less following the original surgery. The average age at the time of the second operation, 54.5 years, with 22 male and 5 female patients, coincides fairly well with the usual age-sex incidence of carcinoma of the stomach. The interval between first and second operations is greater than that seen in marginal ulcer appearance following either gastroenterostomy or subtotal resection for duodenal ulcer.

SUMMARY

1. Carcinoma of the stomach may occur following surgery for duodenal ulcer.

2. Twenty-six cases are documented in the literature to which one case is here added.

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A SIMPLE METHOD FOR THE REPAIR OF LARGE ABDOMINAL AND CHEST WALL DEFECTS

Two Case Reports: An Oleosilioma and Osteochondroma*

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The predominant problem in the treatment of tumors involving a large area of the thoracic or abdominal wall is repair of the defect after excision. The skin and subcutaneous tissue, being either uninvolved or easily mobilized from neighboring regions, can usually be closed without difficulty; consequently the principal problem lies in repair of the bony defect in the thorax or the musculofascial defect in the abdominal wall. Functional and anatomic repair of these defects is essential, otherwise such wounds frequently result in unsightly physical deformity, troublesome paradoxical motion, hernia, and wound disruption.

Because of its location in the chest wall and its size the defect cannot be closed by suture of the wound edges; accordingly, a suitable substitute must be inserted for primary repair. A variety of substitutes has been used, including tantalum and stainless steel mesh, heterologous fascia, dermis grafts, autogenous fascial grafts, pedicle fascial grafts, and various synthetic fabrics.[1-12] Although varying degrees of success have been obtained with all these materials in the repair of both abdominal and thoracic wall defects, a survey of the available experience appears to indicate a preference for autogenous fascia lata because of its available abundance, the relative ease with which it can be obtained, and the lack of deformity resulting from its sacrifice. It is commonly thought that this type of graft, being autogenous and viable at the time of insertion, continues to function as living fascial tissue, and although scar tissue formation is incited by its insertion, wound strength does not depend upon this alone.

Despite the real and theoretical advantages to be obtained from the use of fascia lata, certain technical objections can be made to dependence upon this tissue in the repair of all thoracic and abdominal wall defects. In the first place the requirements for suitable fascia may exceed supply, and in the second, the fascia must be obtained by a second and possibly a third operation. Being a prolongation of what may already be an extensive procedure, the latter may be a definite hazard in the recovery of the patient. Regardless of the extent of the operation, the procurement of fascia lata is frequently attended with poor lighting, inconvenient position of the operative field, and uncertain asepsis. Because of these objections, it is suspected in some instances that tumors are removed with insufficient margin in order to avoid the need of fascia and in others that repair is intentionally not attempted, and the patient, therefore, is unnecessarily subjected to the possible complications mentioned previously.

The ideal solution to the problem would be the development of a satisfactory substitute that could be easily and safely inserted. The recently demonstrated competency with which reconstituted lyophilized homologous arterial grafts function as aortic and arterial substitutes suggested to Usher[10, 11] the use of similarly preserved fascia in the repair of hernias. During the past two years he has used reconstituted lyophilized homologous dura mater clinically in the repair of abdominal wall defects. This material has been an excellent substitute in these cases as evidenced by the infrequent recurrence of hernia, the lack of wound infection, and the complete restoration of function. Although there is a local attempt at host replacement, the tensile strength of homologous dural grafts removed at operation over a year after insertion remained unchanged, and this was associated with little change in the microscopic architecture of the grafts. The excellent clinical results obtained by this investigator, the ideal structural and functional characteristics of the

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homologous dural graft, and the potential general availability of these grafts resulting from the wide distribution of tissue banks seemed to warrant more extensive clinical trial of this substance. Having observed and been impressed by the possibilities of this material, we were encouraged to use this method in the repair of two large defects, one of the abdominal wall and one of the thoracic wall. Because of the extremely gratifying results in both cases and the unusual nature of the tumor in one patient, these two cases are reported in detail.

CASE REPORTS

Case 1. L. B., a 36-year-old married white man, was admitted to the Methodist Hospital, Houston, Texas, on November 6, 1956, because of an abdominal wall tumor. Eight years prior to this admission the patient had received approximately twenty weekly inguinal injections of a silica and olive oil mixture for inguinal hernia. These injections were followed almost immediately by the development of a local area of tenderness, redness, and induration about the size of the palm. Gradually this area increased in size until three years before admission, at which time much of the right lower quadrant was involved. A biopsy of the mass performed at this time showed a fibrous chronic inflammatory reaction with foreign body giant cell response involving the full thickness of the abdominal wall. In an effort to arrest the inflammatory reaction roentgen therapy (500 r) was given in five treatments of 100 r each. Despite this treatment, the mass continued to increase in size particularly in the region of the right scrotum where a large hydrocele of the testicle had developed. Consequent to these complications, excision was attempted in July, 1954, but because of the extent of the tumor and the possibility of vascular involvement, the operation was limited to excision of the right scrotal mass including the testicle and a partial excision of the main mass in the right lower abdominal wall with cautery. There was partial relief of symptoms for a brief period after this operation; however, the mass resumed its growth and gradually involved the entire right side of the abdomen, the lower chest and upper thigh. The rigidity of the tumor covering such an area produced difficulties in motion to the extent that the patient was unable to bend forward. Respiratory motion in deep breathing and coughing caused pain in the region of the mass.

Although the benign nature of the tumor had been established by two previous biopsies, complete excision was felt necessary for cure and relief

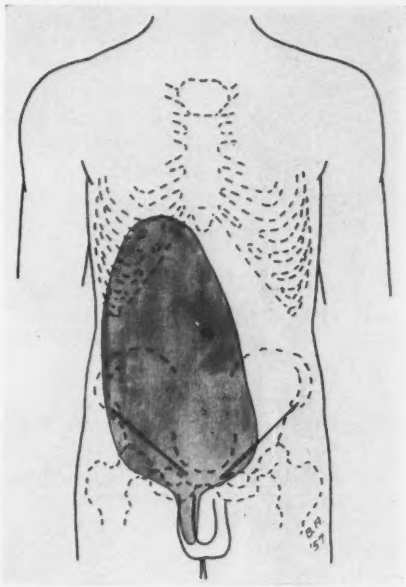

FIG. 1. Diagram showing position and extent of tumor.

of symptoms; consequently, the patient was accepted for treatment. Physical examination at this time revealed a hard, thick, stiff, immobile, woody mass below the skin and subcutaneous tissues involving most of the anterior abdominal wall. The mass covered the entire right anterior abdominal wall and about one-third of the left lower quadrant. There was extension for several centimeters over the costal margin above and the inguinal ligament below (fig. 1). Retroperitoneal extension along the spermatic cord was suggested by the presence of a mass in the right side of the pelvis by rectal examination. The findings by physical examination otherwise were normal. Routine studies of the blood and urine and roentgenograms of the chest and abdomen were normal.

Complete excision of the tumor mass was performed November 7, 1956, under ether anesthesia. Skin and subcutaneous tissue flaps were developed over the tumor through a long oblique incision that extended from the pubis to a point in the right midaxillary line that lay midway between costal margin and iliac crest. Following the delineation of the tumor limits by this exposure (fig. 2), the tumor was resected *en masse*. Complete excision required the removal of the entire musculofascial elements of most of the right anterior abdominal wall including a small area of peritoneum. A 5-cm. strip of posterior rectus

FIG. 2 (*top*). Photograph taken at operation showing tumor before excision.
FIG. 3 (*center*). Photograph taken at operation showing large defect after excision of tumor.
FIG. 4 (*bottom*). Photograph showing defect repaired with use of two large sheets of reconstituted lyophilized dura mater.

FIG. 5. Diagram showing large defect of abdominal wall and its repair using reconstituted lyophilized dura mater.

sheath and rectus abdominis muscle and fascia were saved in the upper part of the wound. The fascial elements surrounding the rectus abdominis muscle in the left lower abdomen were excised. Posteriorly, the mass extended retroperitoneally into the loose areolar space around the bladder and along the iliac vessels which were partially surrounded by the tumor. This extension was removed *en bloc* with the main body of the mass. The large defect (fig. 3) was repaired by closure of the relatively small peritoneal defect and then insertion of two large sheets of reconstituted lyophilized dura mater which were sutured to the remnants of the transversus abdominis muscle and posterior rectus sheath above, the origin of the oblique muscles and iliac crest laterally, the pectineus muscle and pubis inferiorly, and medially to the remnant of the rectus sheath below and the nonresected rectus sheath above (figs. 4 and 5). The skin and subcutaneous tissues were closed in layers over the abdominal wall repair. The potential dead space between the subcutaneous tissue and the fascial repair was drained with two no. 24 hard rubber catheters which were inserted through two small separate incisions. A bulky pressure dressing resembling a hip spica of fluffed gauze and elastoplast was applied to the lower chest, abdomen and right thigh. The catheters were attached to one and one-half pounds of suction and approximately 250 cc. of serosanguinous material was obtained during the first thirty-six hours, after which there was no further drainage. The catheters were removed five days after operation without disturbing the pressure bandage which was removed and replaced with an abdominal encircling elastoplast bandage eight days after operation. Ambulatory activity was begun eight days after operation. After the wound had healed solidly without the slightest complication, the sutures were removed and the patient discharged twenty-one days after operation. Full activity as an insurance salesman was resumed during the succeeding four weeks and at the present time, one year after operation, the patient has a solid, well supported and symmetrical abdominal wall without evidence of hernia (fig. 6*a* & *b*).

Pathologic examination after operation showed

FIG. 6. Photograph taken in the upright position, 12 months after operation showing the location of the incision and the absence of hernia.

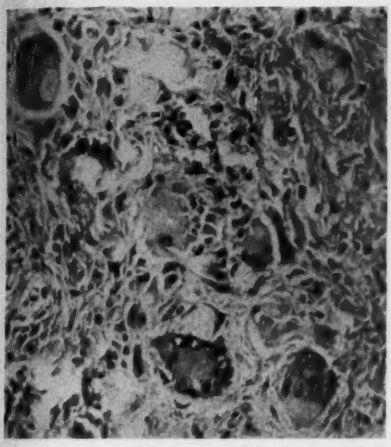

FIG. 7. Photomicrograph showing numerous foreign body giant cells scattered in dense fibrous tissue.

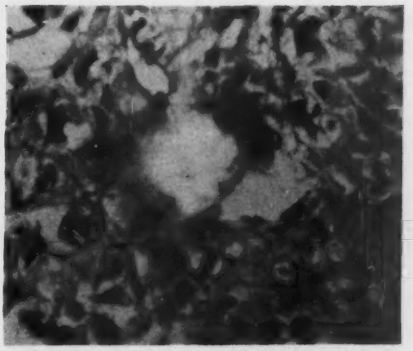

FIG. 8. Photomicrograph showing a fragment of silicon in center of field.

FIG. 9. Photograph showing deformity produced by tumor below the right scapula.

a specimen 43 cm. in length, 12 cm. in width, and 7 cm. in thickness which consisted of an irregular mass of firm tissue with attached muscle, fascia, and fat. The cut surface of the mass was indurated, yellow-grey in color and lobulated by interspersed soft fibrous tissue. Microscopically the tumor mass consisted predominantly of a hyalin fibromatous reaction with collagen deposition; however, there were scattered areas of calcification, fibroblastic proliferation and, in places, definite focal granulomatous changes (fig. 8). Examination by polarized light revealed tiny refractile foci consistent with deposits of silica (fig. 8).

Case 2. E. C., a 17-year-old unmarried white man, was admitted to the Jefferson Davis Hospital, Houston, Texas, on November 30, 1956, because of a mass in the right posterior chest wall. This mass when first noted was slightly tender and about the size of a small marble. During the three succeeding years the tumor gradually grew to the size of an orange; however, there was no change in pain or tenderness. Physical examination at the time of admission was within normal limits except for the presence of a hard, fixed, round, elevated mass 6 cm. in diameter in the chest wall immediately below the lower angle of the right scapula (fig. 9). Roentgenograms of the chest revealed an irregular rounded mass containing multiple small areas of radiolucency involving the posterior aspects of ribs 8 and 9 (fig. 10*a* to *c*). A biopsy of the mass was performed under local anesthesia on December 3, 1956. The pathologic appearance of the specimen was that of chondroma; however, in view of the calcification within the tumor revealed by x-ray examination, a clinical diagnosis of osteochondroma was suggested. Complete excision of the tumor and the wound of the previous operation was performed on December 6, 1956. At the time of operation the tumor appeared to arise from the eighth rib with extension on either side to ribs 7 and 9. The muscles of the chest wall in this region were thinned out and adherent to the mass. Consequent to these findings, complete excision required the removal of the chest wall *en bloc* which included

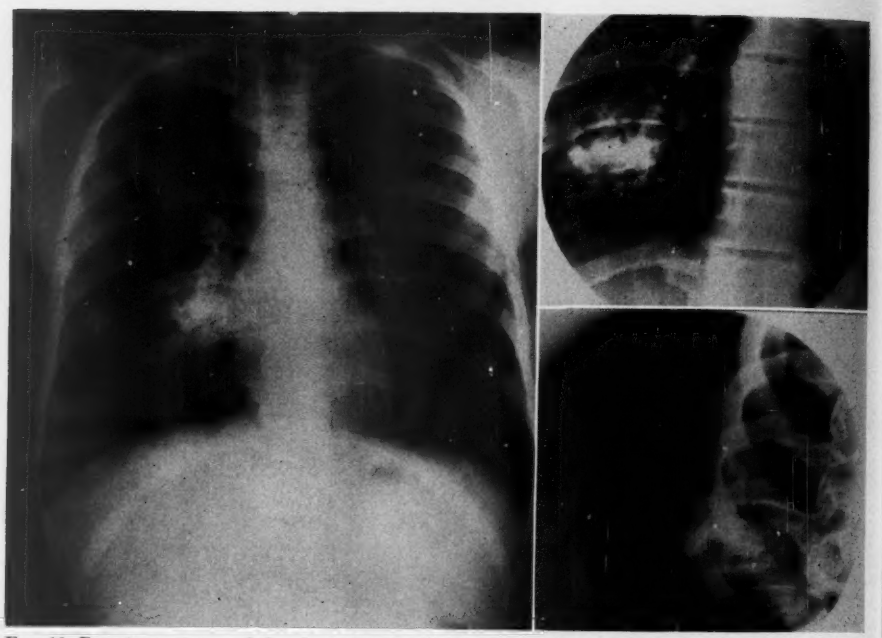

FIG. 10. Roentgenograms of the chest showing (*left*) an irregular mass opposite the right hilum, (*top right*) calcification in the mass which appears to be in the chest wall, and (*bottom right*) definite origin in the bony chest wall.

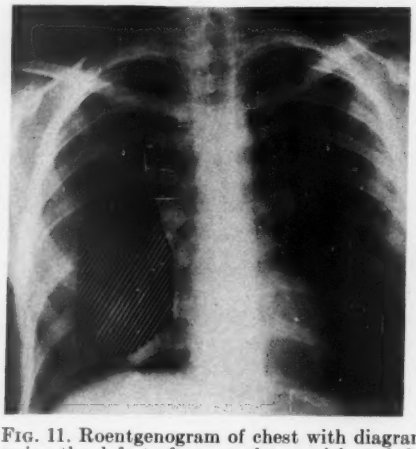

FIG. 11. Roentgenogram of chest with diagram showing the defect after complete excision of the tumor.

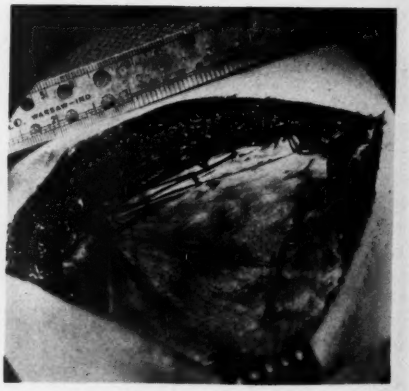

FIG. 12. Photograph taken at operation showing reconstituted lyophilized dura mater covering defect of chest wall.

an ellipse of skin and subcutaneous tissue, muscle, and the posterior parts of ribs 7, 8, and 9 together with the associated intercostal bundles and transverse processes (fig. 11). Reapproximation of the wound edges was possible only in the skin and subcutaneous tissues, and in order to stabilize the chest wall and prevent deformity, the defect in the rib cage was repaired by inserting a sheet of reconstituted lyophilized dura mater which was sutured to the muscles and ribs surrounding the wound (fig. 12).

The patient's convalescence following operation

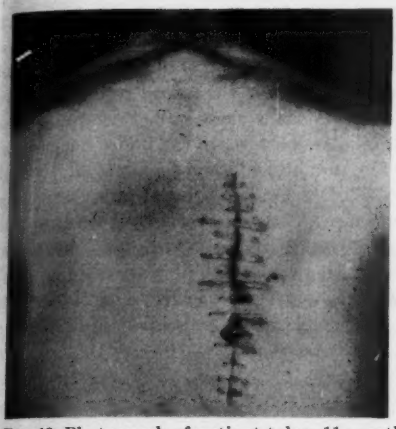

FIG. 13. Photograph of patient taken 11 months after operation showing absence of deformity of the chest wall.

was entirely satisfactory. The wound healed primarily and was not associated with either paradoxical motion or deformity (fig. 13). Pathologic examination of the resected specimen showed a chondroma growing upon an exostosis which originated in the ninth rib. A wide margin of normal tissue was found surrounding the tumor in all directions.

DISCUSSION

The first case presented illustrates the reaction to be expected from the injection of silica and olive oil. The thoracic surgeon familiar with the complications of the various methods employed in the past for collapse therapy of pulmonary tuberculosis recalls the thick fibrous rinds that formed around the oil deposits of patients with oleothorax. The human organism's response to silica is demonstrated by the disease well known as silicosis. It is, therefore, surprising that patients have received such treatment even as late as eight years ago, and if doubt still exists as to the best treatment of hernia, this case should indicate that injection therapy with the use of silica and olive oil has no place in the treatment of human disease. The satisfactory results from herniorrhaphy are well known.

This tumor from foreign body stimulation, because of its continued growth and mechanical interference, required complete excision for its cure. This approach entailed sacrificing the musculofascial structures in a large area of the abdominal wall and created the problem of repair if complications were to be avoided and function restored. The original intent was to use autogenous fascia lata which was to be obtained at the time of operation; however, it became apparent that the patient very likely did not have enough such fascia to cover the defect. Also, although adequate tissue may have been available, two additional operations would have been required for its procurement. Significant extension of an operation which had already required approximately four hours did not appear justified when it could be avoided by the use of a suitable material that was already available. In view of the good results obtained by Usher in the repair of abdominal wall defects with lyophilized dura and our access to this material, the large defect in this case was conveniently and quickly repaired with reconstituted lyophilized dura mater employing the technique described by this author.[10, 11]

The final pathologic diagnosis in the second case was benign chondroma arising in an exostosis. The disease was limited to the ninth rib, and although the growth extended on the chest wall over ribs 7 and 8, these structures and the muscles of the chest wall were not directly involved by tumor. The nature of the tumor was suggested by biopsy before operation, and if at the time of excision a local operation had been performed, the tumor could have been excised with the sacrifice of only a segment of the ninth rib. The need for chest wall defect repair would therefore have been obviated. On the other hand, because of the presence of scattered areas of ossification, the known tendency of these tumors to vary in different regions showing both benign and malignant characteristics, and the relatively high incidence of recurrence after local incision, complete excision was considered the treatment most likely to be associated with cure. Having available ample reconstituted lyophilized dura mater and the gratifying experience obtained with its use in case 1, radical excision was felt justified on the basis of the pathologic potential of the tumor and the ability to repair the defect without resulting deformity or disfiguration.

The established durability of homologous arterial grafts as arterial substitutes would seem to make the use of other homologous tissue logical when viability and highly specialized function are not required in replacement therapy. Body wall defect repair is essentially mechanical in nature; consequently, the requirements of an ideal substitute for this purpose are lasting strength,

host compatibility, and abundant supply. Reconstituted dura maintains its strength for indefinitely long periods of time after implantation, and although fibrous tissue is laid down in and around the dural graft by the host after implantation, undesirable reaction of the destructive foreign body type does not occur. The potentially abundant supply of this material is evident by the large number of tissue banks; consequently, homologous dura mater satisfies the requirements for a fibrous tissue replacement. The good results obtained by Usher in the treatment of hernia and the satisfactory use of this material in the region of two large defects in the two cases reported would appear to warrant further clinical use of this material.[10, 11]

SUMMARY

The principal problem in the treatment of large tumors of the abdominal or thoracic wall is repair of the defect after excision. Since wound approximation is impossible in these cases, a substitute must be inserted for primary repair. Although various substances have been used for this purpose, autogenous fascia lata is the most commonly employed substitute. Various obvious technical disadvantages are associated with the use of this material which must be obtained by an inconvenient prolongation of an already extensive procedure.

The excellence with which homologous arterial grafts have served as mechanical substitutes for excised segments of arteries suggests the use of homologous fibrous tissue as a suitable replacement in the repair of musculofascial defects. Reconstituted lyophilized dura mater has been successfully used in the repair of hernia, and grafts removed at operation as long as a year after implantation have been shown to maintain their original tensile strength. Although these transplants are incorporated into the tissues of the host, destructive replacement does not occur.

Two cases are reported in which tumors were excised and the large defects repaired by employing reconstituted lyophilized dura. The tumor in the first case was a large oleosilioma of the abdominal wall that resulted from the inguinal injection of olive oil and silica administered for relief of an inguinal hernia. Operation required sacrificing over one-half of the anterior abdominal wall. The tumor in the second case was a benign chondroma of the chest wall. Prior to operation the cellular character of the tumor was not completely established, and in view of the high incidence of local recurrence wide excision was performed. The large chest wall defect was repaired using reconstituted lyophilized dura mater. The results in both cases were extremely gratifying and suggest further clinical trial in the use of homologous fibrous tissue in the repair of such defects.

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CONGENITAL HYPOPLASIA OF THE GALL BLADDER*

With Case Reports

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Congenital absence or hypoplasia of the gall bladder is a rare anomaly. Villareal[10] in 1948 was able to find only 60 case reports since 1900. Latimer[6] in 1954 found 13 additional cases and added 3 of his own. The anomaly probably is not as unusual as these reports would indicate. Talmage[9] found it to occur in 0.065 per cent of a large series of autopsy and operative reports.

The clinical symptoms are extremely varied. One-half of the reported cases were encountered as incidental autopsy findings. These patients apparently had no symptoms referable to the anomaly. The remaining individuals presented with symptoms suggestive of cholecystic disease, with obstructive jaundice as the most common finding. The mean age group for the symptomatic cases was between 45 and 53 years of age; the condition was more common in the female.

The theories advanced to explain congenital absence or hypoplasia of the gall bladder are: (1) The hepatic diverticulum from the foregut forms the liver, gall bladder, and extrahepatic bile ducts. The gall bladder and cystic duct results from an outpocketing of this diverticulum. Failure of development of this outpocketing would cause an absence of the gall bladder. (2) The gall bladder and the extrahepatic bile ducts in their early embryologic development are hollow structures. In the so called "solid stage" the lumina becomes obliterated. Either failure of the gall bladder to recannulize, or only partial recannulization, would result in hypoplasia of this structure. The presence of a solid cord residue would favor the latter theory.

At The George Washington University Hospital two cases of congenital hypoplasia of the gall bladder have been encountered. One was an autopsy finding. The other patient was explored because of nonvisualization of the gall bladder, and because of symptoms which were interpreted as due to chronic cholecystitis. Because of the rarity of the condition, these cases are reported.

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CASE REPORTS

Case 1. History. A 58-year-old white woman was admitted, complaining of severe right upper quadrant pain, nausea, vomiting and diarrhea. There was no history of chills, fever or jaundice. She had a history of progressive fatty food intolerance during the preceding five years. An earlier gall bladder series had shown nonvisualization of the gall bladder.

The past history disclosed the patient to be a well controlled diabetic with hypertensive vascular disease. She had had two previous surgical admissions, one for an esophageal hiatus herniorrhaphy and one for a pulmonary lobectomy for tuberculosis.

Physical examination. Physical examination revealed an obese white woman in no acute distress. The blood pressure was 200/100, and the pulse 108. There was no evidence of jaundice. Positive physical findings were limited to the abdomen, showing moderate right upper quadrant and right flank tenderness. There were no masses or organs palpable. The peristalsis was hypoactive.

Laboratory data. The white blood count was 10,950, with a normal differential count. Urinalysis showed moderate albuminuria, glycosuria, and pyuria. Blood urea nitrogen was 13 mg. per cent, and amylase, 22 mg. per cent (normal).

X-ray data. The chest gave no evidence of active disease, the i.v. pyelogram was normal, the gall bladder series indicated nonvisualization, and the gastrointestinal series was normal.

Hospital course. A diagnosis of chronic cholecystitis was made and the patient was prepared for elective surgery. At laparotomy a few fine adhesions were found between the omentum and the under surface of the liver. As these were divided a hepatic depression was encountered at the anatomic site of the gall bladder; however, no gall bladder could be found. Further abdominal exploration was then carried out. This failed to reveal any abnormalities. The common duct was visualized and found to be twice normal size.

At the point of origin of the cystic duct a fibrotic 1-cm. cord was encountered. At the end of this there was a fibrotic bulb measuring 1 cm. in diameter. This was removed and the common duct was opened. No calculi or obstructions were found. A T-tube was inserted and the abdomen closed. The microscopic diagnosis of the removed specimen was reported as "hypoplasia, gall bladder." A cholangiogram on the tenth postoperative day showed slight duct dilation, but no evidence of abnormalities. The T-tube was removed and the patient discharged. Follow-up in the clinic has revealed occasional recurrence of the episodes of pain and vomiting. Repeat gastrointestinal series, amylase, and liver studies have remained normal.

Case 2. History. A 57-year-old white female diabetic was admitted for terminal care. The past history revealed that the patient had generalized carcinomatosis originating from the right breast. There was no history of hepatic or gall bladder disease. Physical examination on admission showed slight cyanosis, dyspnea and orthopnea. The pulse was 130 per minute and respirations were 25 per minute. Examination of the lungs disclosed generalized coarse rales, with absent breath sounds, and dullness on the right side. The right breast was hard and ulcerated. Nodes were palpable in the right axilla and supraclavicular region. The abdomen was normal.

The patient was digitalized and oxygen was administered. Her course was rapidly downhill and she died on the seventh hospital day.

At autopsy, generalized lymphatic, visceral, and lung metastases from an adenocarcinoma of the breast were confirmed. An incidental finding was a hypoplastic gall bladder measuring 2.5 cm. in length and containing 1 cc. of normal appearing bile. The common bile duct was dilated but contained no calculi. Microscopic sections of the gall bladder showed a slightly thickened serosa. The submucosa was normal. The mucosa showed several cholesteral deposits. There was no evidence of inflammatory changes. The pathologic diagnosis was "hypoplastic gall bladder."

SUMMARY

1. Congenital absence or hypoplasia of the gallbladder is a rare anomaly. There have been only 76 cases reported up to 1954.

2. Approximately one-half of the reported cases were found as incidental autopsy findings. The remaining clinical patients presented with symptoms referable to the gall bladder or extrahepatic biliary ducts.

3. The most common presenting complaint in the clinical reports was obstructive jaundice due to choledocholithiasis.

4. Two cases were presented: one was found as an incidental autopsy finding; the other was of a patient who presented with symptoms of chronic cholecystitis. X-rays showed nonvisualization of the gall bladder. A laparatomy was performed and a hypoplastic gall bladder removed. The common duct was dilated but contained no stones. A one-year follow-up revealed recurrent episodes of her preoperative symptom complex.

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